

Pull Type Disc & Sickle Mowers



Service Training Manual







Pull Type Disc & Sickle Mowers



Service Training Manual





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PRODUCT SERVICE INTRODUCTION



ROTARY DISC MOWER
CONDITIONERS

Back



By completing this course, you will:



- Learn the models offered
- Learn the common features
- Learn what options are available



Side Pull:

- New Holland (NH) Models:
- H7220 9'2" cut Rolls
- H7320 9'2" cut Flails
- H7230-10'4"Cut-Rolls
- H7330-10'4"Cut-Flails
- * Discbine 209 9'2" Rolls or Flails
- * Discbine 210 10'4" Rolls of Flails
- Case IH (CIH) Models
- DC92-9'2"cut-Rolls or Flails
- DC102-10'4" Cut-Rolls or Flails
- * DC93 -9'2" Cut -Rolls or Flails
- * DC103 10'4" Cut -Rolls or Flails



Center Pull – Pivot tonque

NH Models

- H7450 13' Cut Rolls
- H7550 13' Cut Flails
- □ H7460 15'7" Cut Rolls
- H7560 15'7" Cut Flails
- 310 10'4" Cut Rolls or Flails* 312 - 11'6" Cut -Rolls of Flails * 313 - 13' Cut - Rolls or Flails 316 - 16'3" Cut - Rolls or Flails
- CIH Models:
- DC132 13' Cut Rolls or Flails
 DC162 15'7" Cut -Rolls or Flails
- DC133 13' Cut Rolls or Flails DC163 - 16'3" Cut - Rolls or Flails





* Sourced from Kongsklide





Heads for Self Propelled machines:

- NH Models:
- □ 720HD 13' Cut 10 Discs Rolls
- 750HD 15' 5" Cut 12 Discs Rolls
- Durabine 416 16' Cut 10 Discs-Rolls
- 770HD 18' Cut 14 Discs Rolls
- Durabine 419 19' Cut 12 Discs-Rolls



CIH Models:

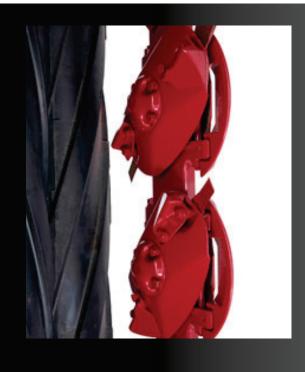
- RD132-13' Cut-10 Discs Rolls
- RD162-15' 5" Cut 12 Discs Rolls
- RD163-16' Cut-10 Discs-Rolls
- RD182 18' Cut 14 Discs Rolls
- RD193-19' Cut 12 Discs- Rolls



Modular Cutter Bar

- Separate gearbox
- Separate drive shafts
- 2 reversible knives per disc
- Disc counter rotate
- Some end discs co-rotate
- NH Shock Pro Hubs
- CIH Shock Hub drive







- Windrow and Swath adjustments.
- Swath gate
- Windrow forming Shields.
- Adjust without tools





- Conditioner Systems.
- Rubber intermeshing
- □ NH Chevron Design
- □ CIH Spiral design.
- Adjustments for timing, pressure and roll gap



- Independent floating fingers
- Adjustments for speed and hood clearance







Header Adjustments

- Header tilt to change cutting height
- Flotation with floatation springs

Auger.

Single, Full Floating on 18' SP heads only

Servicability

- Fold up Safety shield for Maintenance
- Lube points well identified
- Oil Check Plugs & Level Indicators





Options:

- Hi Skid Shoe kit
- Flail slow down kit
- Steel conditioning rolls
- Dimpled Hood for Flail Conditioner
- Wide Fin thin Kit



Back



Course summary

side pull and center pivot available in Units are designs

use a Modular Conditioners Disc Mower **Cutter Bar** All Frotary Design

forming shields can be adjusted The swath gate with out hand and windrow tools

> rubber rolls or equipped with intermeshing Units can be a single flair rotor

have slip clutch PTO driven and All models are protection







PRODUCT SERVICE INTRODUCTION

SICKLE BAR MOWER
CONDITIONERS





By completing this course, you will:



- Learn the models offered
- Learn the common features
- Learn what options are available



Side Pull:

- New Holland (NH) Models:
- □ 472 7'3" cut
- □ 488 9'3" cut

Center Pull – Pivot tongue:

- New Holland (NH) Models
- 499-12'3" cut
- H7150 trail Frame14' or 16' heads
- Case IH (CIH) Model:
- SC101 trail Frame





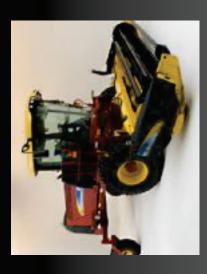
Heads for Self Propelled and Trail Frame Machines:

- NH Models:
- □ 12HS−12'3" Cut
- 14HS-14'3" Cut
- 16HS-16'3" Cut
- 18HS 18"3" Cut

CIH Models:

- HDX 122-12'3" Cut
- HDX 142 14'3" Cut
- HDX 162 16'3" Cut
- HDX 182 18"3" Cut







Cutter Bar and Guards

- Bolt on Knife sections.
- Smooth, Over or UnderSerrated Sections Available
- Standard Double Guards
- Stub Guards are Optional

Counter stroking sickles.

Standard on all 12' or larger units







- Windrow and Swath adjustments.
- Swath gate.
- Fluffing Baffle.
- Windrow forming Shields.
- Adjust without tools
- Form Wide Swath for faster drying
- Form Windrows for fast pickup with Choppers





Rubber intermeshing Conditioner Rolls.

- NH Chevron Design
- □ CIH Spiral design.
- **Torsion Bar Tensioning**
- Adjustments for timing
- Pressure with hand Crank A
- Gauge B indicates Pressure
- Roll Gap adjustment C







Header Adjustments

- Header tilt to change guard angle
- Flotation set with floatation springs
- shoe Adjustments without Header height with skid tools



- Raise and lower to suit most crops
- Leans Crop Forward so Stems Feed First
- Optional Extensions for Tall Cane Crops





Fully Adjustable Reel.

- Fore and Aft Positioning
- Height for Better Crop Pickup
- Speed Adjust to Match Ground Speed
- Auger or Conditioning Rolls and Reduce Tine Release Position to Deliver Crop to Carryover.
- Belt Driven to Prevent Overload by Slipping



Auger.

- Single, Full Floating on SP heads only
- Delivers Crop From Reel to Conditioner Rolls

Serviceability.

- Flip up Safety Shields for Maintenance
- Well Identified Lube Points
- Gearbox oil Check, Fill and Drain Plugs
- Access to All Adjustments





Options:

- Crop dividers
- Push bar extensions
- Gauge Wheels for SP Heads
- Reel slow down kits
- Slatted steel conditioning rolls

Back



Course summary

without tools formation is Windrow or adjustable swath

Reel is used to gather crop pickup and adjustable A fully

mow on either Center pivot machines let side of the operators tractor

> cutterbar stem delivers crop The reel end first to the

auger and/or rolls for allowing moisture to delivered to the The cut crop is conditioning escape

General information

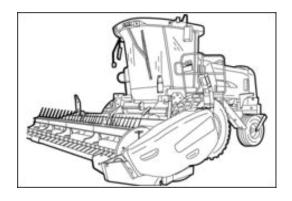
Left and right are determined by standing behind the unit looking in the direction of travel.

New Holland Models 12HS, 14HS, 16HS and 18HS can be used on a self propelled windrower or TV6070 tractor. The 14HS, 16HS, or 18HS can be used on an H7150 Pivot Tongue Frame. These headers will fit on **Speedrower 160, 180 and 260's.** The 12HS will only operate properly on tractors with an outside tire width of less than the cutter width of:

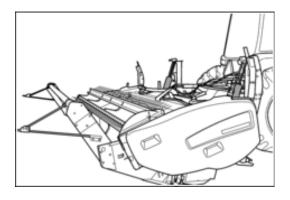
3.73 m (**146.85 in**). The SpeedRower 160, 180 and 260 tractors require **16.9 in** x **28 in** tires. The mounting of the sickle on a self propelled windrower is described in the windrower Operator's Manual.

Case IH Models HDX122, HDX142, HDX162 or HDX182 can be used with the **WD1504, WD2104 or WD2504 self propelled windrower**. All but the HDX122 fill also fit the SC101 Pivot Tongue Frame

The HS headers will mount on the 2330BF adapter frame for use on the TV6070 Bi-directional tractor. The mounting of the sickle on the frame and the frame on the tractor is described in the 2330BF Operator's Manual.



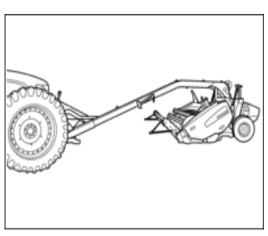
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The New Holland 14HS, 16HS and 18HS can be mounted on a H7150 Pivot Tongue Frame. The mounting of the sickle on the frame and the frame on a tractor is described in the H7150 Operator's Manual. The 12HS is not for use with the pivot tongue mower conditioner frame.

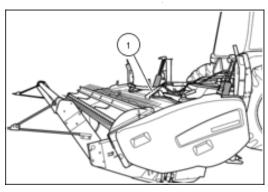
Case IH Models HDX142, HDX162 or HDX182 can be used with the SC101 Pivot Tongue Frame



36082838 3

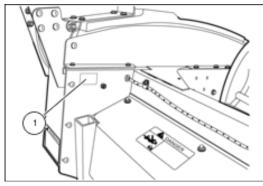
Product identification

The product identification number (PIN) plate is located at (1) on the front side of the tilt cylinder mounting bracket.



10025335

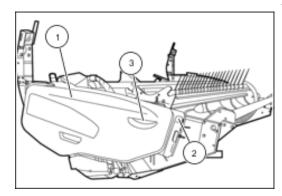
NOTE: The PIN plate (1) on some units is located on the inside of the left side sheet.



86082784

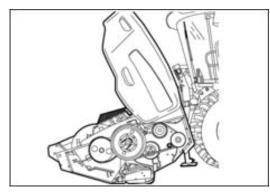
Shielding

To open the side shields (1) unfasten the rubber latch at (2). There is a hand hold built into the shield at (3).



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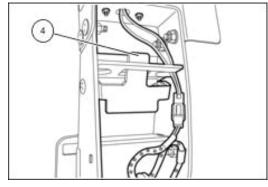
Rotate the shield toward the rear until it latches.



86082778 2

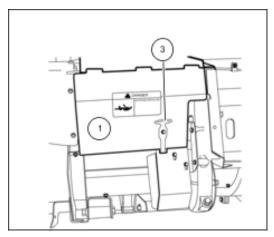
To close the shield:

- 1. Rotate the shield rearward.
- 2. Push the top of the latch (4) forward.
- 3. Lower the shield.
- 4. Fasten the rubber latch.



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There is a shield **(1)** over the drives at the rear right side of the unit to provide access for lubrication. To open the shield, unfasten the rubber latch **(3)**.



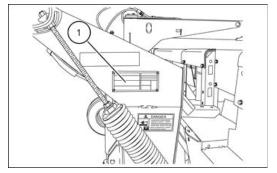
86082776 4

Product identification - Disc Mowers

NOTE: On this equipment, left and right are determined by standing behind the unit, looking in the direction of travel.

Product Identification Number (PIN)

The PIN plate (1) for the disc mower-conditioner is located on the right-hand side of the trail frame.



- 93113258 1

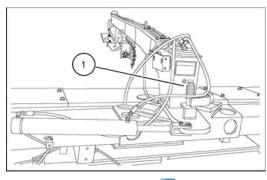
- Model (1)
- (2) PIN number
- (3) Weight
- (4) Model year
- (5) Year of construction



76107631A 3



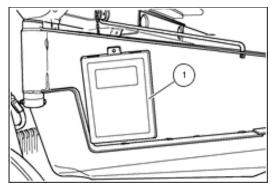
In addition, a PIN plate is installed on the rear of the tongue at (1). This PIN may be required when ordering parts that attach to the tongue. Give your dealer the model and PIN of your disc mower-conditioner when ordering parts. Always order genuine factory parts from your authorized dealer.



93113257 4

Manual holder

A manual holder (1) is mounted on the left side window shield, and provides a readily accessible storage location for this manual.

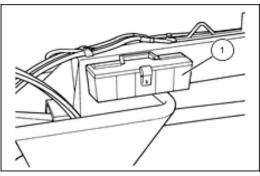


30004610 5



Tool box

A convenient toolbox (1) is provided for storage of tools, a grease gun, and spare cutter bar parts. Use a hairpin cotter to keep the toolbox lid closed. The toolbox can be removed from the unit by opening the lid, and removing the hairpin cotter clipped inside. Tip the toolbox up off of the support bracket. When reinstalling the toolbox, position the lip on the back over the top of the bracket, and tip the toolbox down over the clip. Reinstall the hairpin cotter to retain the toolbox.

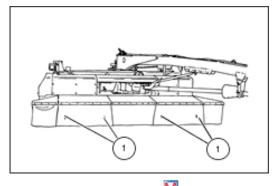


1431-1-27N 6



Shielding

NOTE: Unhook the cutter bar shield skirt spring snaps (1) at skirt overlaps before either of the front shields are raised. Be sure to reattach them after before operating the machine.



4896-08N 7

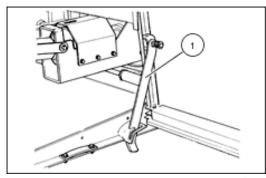
The front shields are automatically held in place by a lever (1). Move the lever sideways to release and lower the front shields.

NOTICE: Close shield prior to operating machine to prevent damage to the shield.

AWARNING

Flying objects! Machines with rotary discs can fling foreign objects toward the operator.

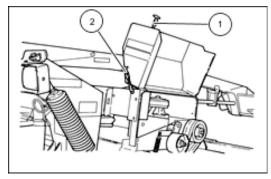
Keep all skirts and shields in place. Failure to comply could result in death or serious injury.



W0024A

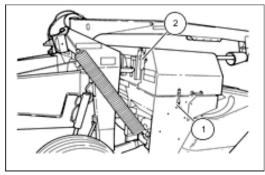
4899 05RN

The right side shield can be lifted up by releasing a rubber strap (1) and pivoting the shield upwards. The shield can be held open with a rubber strap (2) to prevent the wind from blowing the shield closed.



19991330N 9

To close the shield, release the rubber strap (2), swing the shield shut, and rehook the rubber strap **(1)**.



19991331N 10



Product overview

AWARNING

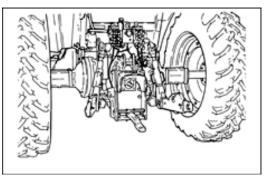
Flying objects! Machines with rotary discs can fling foreign objects toward the operator. The use of a tractor with an enclosed cab is recommended when operating a rotary disc cutting machine.

Failure to comply could result in death or serious injury.

W0191A

- 1. **1000 RPM** PTO.
- 2. **67 kW** (**90 Hp**) minimum PTO hp.
- 3. ASAE standard hitch and PTO dimensions conforming to category 2 or 3 specifications.

NOTE: For tractors with a stepped, or a bent drawbar, the bend must be positioned to meet ASAE hitch and PTO specifications. PTO separation or bottoming out could occur if these



97-1533N 1



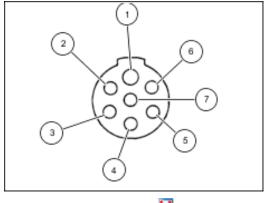
specifications are not followed.

- 4. Two remote hydraulic circuits with a minimum of 10342 kPa (1500 psi), and a maximum of 19305 kPa (2800 psi). One of the circuits must be a two-way circuit for the tongue swing cylinder.
- 5. Adequate ballast, wheel spacing, and tire inflation to stabilize the tractor on hillsides.
- 6. For proper light function, this unit must be connected to a tractor incorporating an SAE standard 7-pin conductor electrical socket which conforms to **SAE J560**. If your tractor does not have a 7-pin conductor electrical socket, obtain a connector socket from your Dealer.

Installing the socket

Use the tractor wiring diagram or, if necessary, use a test light to identify the tractor wires. Connect the wires to the socket as follows:

Pin	Connector ID	Attached To
1	White (WHT)	Ground wire, all lights
2	Black (BLK)	Not Used
3	Yellow (YEL)	Left side amber light
4	Red (RED)	Brake lights
5	Green (GRN)	Right side amber light
6	Brown (BRN)	Taillights
7	Blue (BLU)	Not used

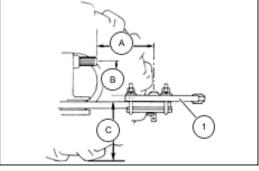


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Tractor drawbar dimensions (standard tongue)

The disc mower-conditioner requires that the drawbar be adjusted to provide a distance of 609 mm (24 in) from the end of the tractor PTO shaft to the center of the hitch point on the tongue; the same distance is necessary whether using an 1000 RPM PTO 1 - 3/8 in or 1000 RPM PTO 1 - 3/4 in. This dimension may be obtained in two ways: Option 1

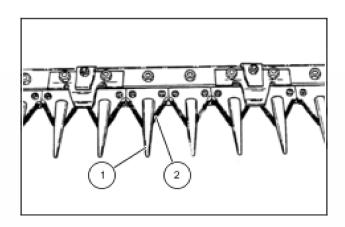
Adjust the tractor drawbar to a distance of 406 mm (16 in) dimension (A) from the end of the tractor PTO shaft to the center of the drawbar hole, and install the drawbar extension (1) that comes with the disc mower-conditioner. The drawbar extension increases drawbar length by 203 mm (8 in) to provide the 609 mm (24 in) length required.



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Disc and Sickle Mower Conditioners Technical Training



Sickle Bar Operation

Cutter bar maintenance

▲DANGER

Crushing hazard!

Safety locks built into the header lift system lock the header in the raised position. Engage the safety locks on both sides before working under a raised header.

Failure to comply will result in death or serious injury.

D0029A

C0006A

Cutter bar

The cutter bar is like a pair of shears. The cutting edges of the guards (1) and knife sections (2) must be sharp and close together for smooth, clean cutting.

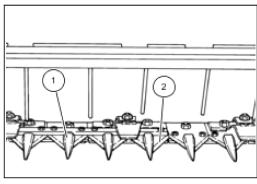
IMPORTANT: Many mowing problems are caused by improper adjustment or poor maintenance of the cutter bar.

IMPORTANT: Overserrated, fully bolted knife sections are original equipment on these headers. Purchase parts from your authorized dealer to replace worn parts or to convert to other type of knife sections.

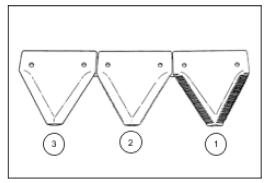
Overserrated sections (1) stay sharp longer than smooth or underserrated sections and cause less wear to cutting edges of guards. Sharpening will remove the overserrations and is not recommended.

Underserrated sections (2) can be sharpened, but do not stay sharp as long and may cause faster guard wear.

Smooth sections (3) provide good cutting action in grass hay, but require frequent sharpening, good guards, and frequent knife clip adjustment. Chrome knife sections may stay sharp longer but may be nicked by gravel or small stones very easily.



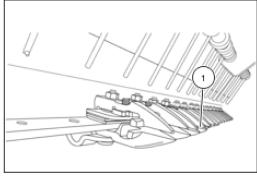
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20100794 2

Stub guards (1) reduce plugging at the cutter bar but require frequent alignment, good sharp knives, and closely adjusted knife clips. Stub guards do not protect the front of the knife sections from stone damage. Also they may not leave as nice a looking stubble as standard sections.

The maintenance of the cutter bar with standard guards is followed by the maintenance of the stub guard cutter bar (1).



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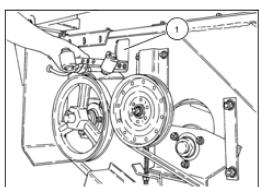
Spare knife storage **ACAUTION**

Sharp object!

Wear gloves when handling worn discs.

Failure to comply could result in minor or moderate injury.

Two spare knife assemblies can be stored in the frame tube (1).



20022820 4

Removing and replacing knife assemblies Removal

- 1. Remove the knife head bolt (1). The knife head bushings are tapered to fit countersunk holes in the rocker arms (2).
- Loosen the bolt (3) that attaches the rocker arms to the connector assembly. Drop the knife head out of the rocker arms.
- 3. Pull the knife assembly out of the header. If the knife is hard to remove because the knives or guards are bent, loosen the guard bolts.
- 4. Remove the other knife assembly in the same manner.

AWARNING

Avoid injury! Always do the following before lubricating, maintaining, or servicing the machine.

- 1. Disengage all drives.
- 2. Engage parking brake.
- 3. Lower all attachments to the ground, or raise and engage all safety locks.
- 4. Shut off engine.
- 5. Remove key from key switch.
- 6. Switch off battery key, if installed.
- 7. Wait for all machine movement to stop.

Failure to comply could result in death or serious injury.

W0047A

Installation

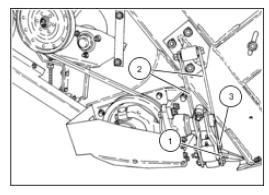
- 1. Install the knife head bolt with the head to the front.
- Use the sickle drive pulley, on the right side of the header, to rotate the header by hand. The knife must be at the center of its stroke.

NOTE: The center of this pulley also has a hex built into it. A slug wrench can be made or purchased from your authorized dealer to turn the header.

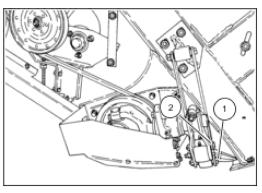
 Tighten the special Grade 8 knife head bolt and connecting rod bolt (1) and (2) to 115 N·m (85 lb ft). Remove and replace the other knife in the same way.

IMPORTANT: Check to be sure the knife back is centered, front to back, in the opening of the guard. If the knife back is too far forward or back, or the outer section is too high or too low, refer to Sickle drive adjustment later in this section.

IMPORTANT: Align the guards and adjust the knife clips.



20022844 5



20022844 6

Knife head bushing replacement

Replace the knife head bushing if the rubber is loose or charred from heat. Use a vise or press to remove the knife head bushing. Press against the outer shell of the bushing with a **32 mm** (**1-1/4 in**) outside diameter socket (**1**). A **15/16 in** socket is about the right size. Press the socket and knife head against a **51 mm** (**2 in**) long, **32 mm** (**1-1/4 in**) pipe nipple (**2**).

When installing the new bushing, press against the outer sleeve, and not the inner sleeve. Press the bushing in until the inner sleeve is centered from side to side.

Hold the knife head and sight along the knife back. The knife must be straight. Rotate the knife 1/4 turn and recheck for bends. To remove bends, clamp the knife back in a vise. Or, lay the high spot down over a tire or the frame. Press at each side of the bend until the knife is straight. Do not straighten the knife with a hammer, as the knife back may get damaged.

Standard knife assembly

Three special inner sections (1) on the right knife have bottom countersunk holes for a smooth surface.

Two special inner sections (2) on the left knife have top countersunk holes for a smooth surface.

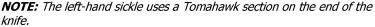
Keep sections tight.

Replace cracked, broken, bent, or badly worn sections. If the front of a section is worn to a point, replace the section as the cutting edge will be too soft to stay sharp. Always clean the knife back so a new section will fit tight. **IMPORTANT:** The left and right side of the machine is determined when facing the direction the machine will travel while cutting.

IMPORTANT: Knife assemblies meet and overlap at the center of the header. To prevent interference, the top of the left knife assembly and the bottom of the right assembly must be smooth at the inner ends.

Install all knife sections with the bevel edge up except the last section or the inner section (1) on the left sickle assembly. This section is installed with the bevel side down.

Serrated shank bolts (2) (round flat head with serrated neck) hold inner sections to the inner end of each knife assembly. The bolt heads fit countersunk holes (3) in the sections. The bolt neck fits holes (4) in the knife back or extension. The bolt nuts (5) have a flat side and a tapered side. The tapered side goes toward the back bar or extension and into a recession in the back bar or extension.

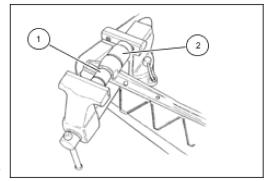


Grade 8, slotted, round-head bolts with serrated shanks are used in the other sections. Different lengths of Easy Bolts are used where the knife head attaches. These bolts are available from your authorized dealer under the trade name Easy Bolts.

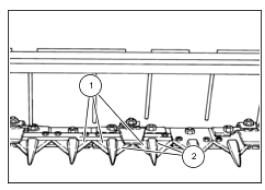
IMPORTANT: If the locknut and a wrench are used to install these bolts, the threads will strip before the bolts are fully seated. Use a hammer, vise, press, or special tool to seat the bolts. Remove the knife if many bolts have to be installed.

Use a hammer to drive the Easy Bolt serrations into the knife back as shown. Support the knife on a block or plate with a hole for the Easy Bolt. Serrations prevent the bolt from turning. If the bolts are not damaged, only a **7/16 in** wrench is needed to replace sections.

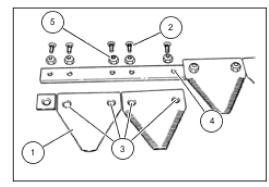
A special tool **(1)** is available from your authorized dealer, to seat the bolts while the knife assembly is still in the mower-conditioner. Refer to the Specifications section of this manual for the special tool part number.



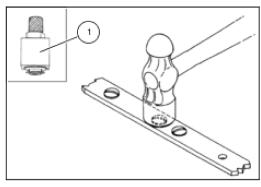
20100795 7



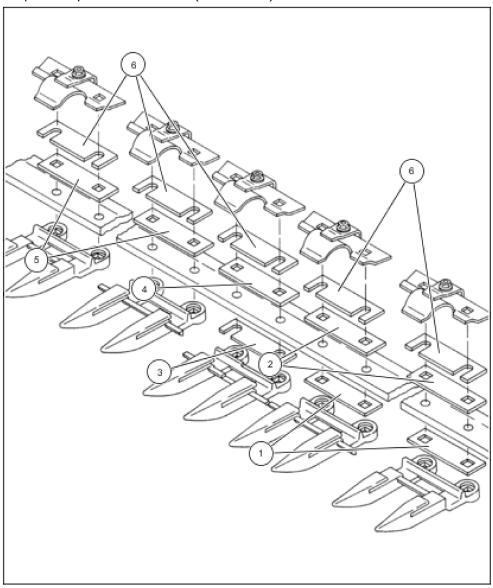
20100796 8



20100799 9



20100798 10



2300-01 11

Cutter bar shimming - standard guards

These sickle headers use two counterstroking knives, which overlap by two sections in the center, to cut smoothly and efficiently. To prevent the knives from becoming damaged at the overlap, the cutter bar components must be properly shimmed so that the left knife assembly is slightly lower than the right knife assembly. When removing and installing guards and knife hold-down clips, ensure that shims are installed as follows:

All guards to left of center guard

One **3 mm** (**0.12 in**) shim **(1)** between guard and cutter bar.

One 1.5 mm (0.06 in) shim (2) between knife hold-down clip and cutter bar.

Center guard

One **0.25 mm** (**0.01 in**) shim (**3**) between guard and cutter bar as required to provide correct alignment to left side guards. One **4.8 mm** (**0.2 in**) shim (**4**) between knife hold-down clip and cutter bar.

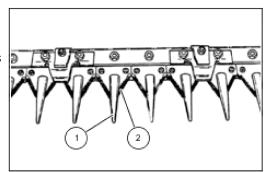
All guards to right of center guard

One **4.8 mm** (**0.2 in**) shim **(5)** between knife hold-down clip and cutter bar.

A **0.25 mm** (**0.01 in**) shim **(6)** may be installed between the knife clip and the cutter bar to provide proper clearance to the knife assembly. Refer to Knife hold-down clips in this section for additional information.

Guards - standard

The main purpose of the guards (1) is to protect the knife (2). However, they also have several other functions. They help to lift and separate the crop. They have a ledger surface that together with the knife section acts as a shear to cut the crop. They help guide the knife back and also help keep trash from building up on the knife back.

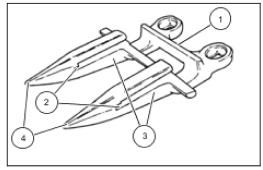


4837-16N 12

Replace guards that are worn and rounded at the edge of the ledger surface (3).

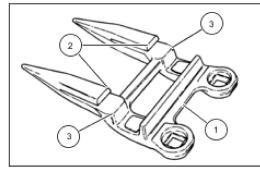
The tips **(4)** of the guards should be relatively sharp. If they are blunted from contact with foreign objects, material can hairpin and plug the cutter bar. A hand grinder can be used to restore the original point.

IMPORTANT: Use a special guard (1) at the center of all headers. This guard has a deeper opening (2) and lower rear support so that the left and right knives can overlap.



A2409-12N 13

Use special guards (1) at the outer ends of the cutter bar. Top lips (2) are shortened and the guard has a deeper opening to clear the knife drive rocker arms. Outer wings (3) are cut off to prevent running down crop.

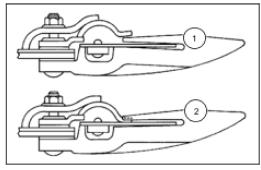


A0261-10N 14

The ledger surfaces of the guards should be aligned so they all hold the knife at the same height. The knife sections should rest on the ledger surface of the guards.

This image illustrates improper guard maintenance (1), and proper maintenance (2).

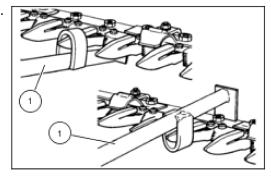
If the guards are not aligned, there will be excessive wear on the knife sections and guards.



53065233 15

Align the guards to a knife assembly that has been checked for straightness. A homemade guard straightening tool (1) or a heavy hammer can be used to bend the guards up or down for alignment. If a hammer is used to bend the guards, be sure to hit the solid surface in front of the knife section to avoid breaking the lip.

The points of the guards do not have to be in alignment as long as the ledger surfaces are in line and the knife assembly is straight. The outer knife section must contact the ledger surface of the guard.



4889-14&4889-15 16

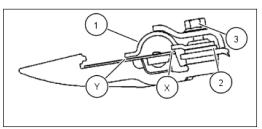
Knife hold-down clips

The correct thickness of shims must be initially installed under the hold-down clips, or the knife assembly overlap sections will be damaged. Refer to Cutter bar shimming-standard guards in this section for additional information.

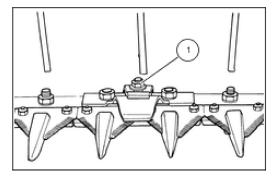
The headers with standard guards have adjustable hold-down clips (1) spaced across the cutter bar. There is not a clip at every guard as the top lip helps to hold the knife from lifting too far.

The lip at the rear edge of the clip holds the rear of the section in place; there should be a clearance of **0.125 - 0.64 mm** (**0.005 - 0.025 in**) between the knife section and the clip at **(X)**. In some cases, a **0.25 mm** (**0.010 in**) shim (**2**) is required to obtain the proper clearance. If the clearance is less than **0.125 mm** (**0.005 in**) the knife may not move freely. Adjust the front of the clip by tightening the nut (**3**) to obtain a clearance of less than **0.50 mm** (**0.020 in**) between the clip and knife section at (**Y**). To compensate for the initial break-in wear, check the clearance after the first 50 acres of operation and readjust if required.

If replacing a clip, be sure to place the plow bolt **(1)** for the adjustable clip through the clip before installing the clip.

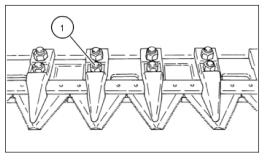


20051132A 1



A4825-01N 2

After adjusting, run the header for a few minutes and check to be sure there are no hot hold-downs. Loosen the nuts (1) on any hot ones one nut flat at a time and recheck them.



20022824 3

Stub guard knife assembly

Replace cracked, broken, bent, or badly worn sections. If the front of a section is worn to a point, replace the section as the cutting edge will be too soft to stay sharp. Always clean the knife back so a new section will fit tight.

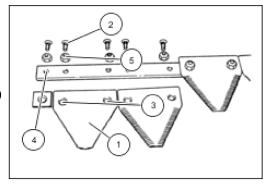
Knife assemblies meet and overlap at the center of the header.

The special taper-head bolts are countersunk into the top of the knife sections and knife support bars in the middle of the cutter bar. These taper-head bolts are secured with beveled nuts underneath the bar.

Install all knife sections with the bevel edge up except the last section or the inner section (1) on the left sickle assembly. This tomahawk section is installed with the bevel side down.

Serrated shank bolts (2) (round flat head with serrated neck) hold the inner, overlapping sections to the inner end of each knife assembly. The bolt heads fit countersunk holes (3) in the sections.

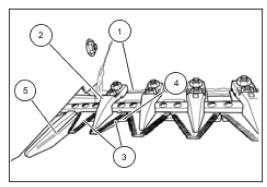
The bolt neck fits holes **(4)** in the knife back or extension. The bolt nuts **(5)** have a flat side and a tapered side. The tapered side goes toward the back bar or extension and into a recession in the back bar or extension.



20100799 1

The outside ends of both knife assemblies have special components. A three-guard plate (1) allows for an odd number of upper hold-down guards (2).

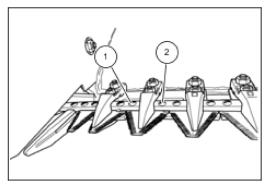
The last outside knife section (3) on both sickle assemblies is a special section with two narrower knives bolted to the support bar as one. The final lower guard piece (4) has a regular stub guard toward the inside, and a standard-looking guard (5) to the outside.



20100800 2

Grade 8, slotted, round-head Easy BoltsTM (1) with serrated shanks are used where the knife head and extension (2) are attached.

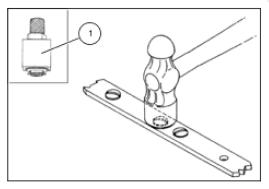
IMPORTANT: If the locknut and wrench are used to install these bolts, the threads will strip before the bolts are fully seated. Use a hammer, vise, press, or special tool to seat the bolts. Remove the knife if many bolts have to be installed.



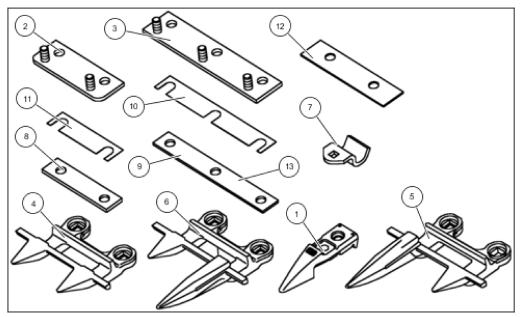
20100800 3

Use a hammer or other device to drive the serrations into the knife back. Support the knife back on a block or plate with a hole. The serrations prevent the bolt from turning. If the bolts are not damaged, they do not require replacement, and only a **7/16 in** wrench is needed to replace sections.

A special tool (1) is available from your authorized Dealer, RS711426DS, to seat the bolts while the knife assembly is still in the mower-conditioner. Torque all knife bolts to . $8 - 11 \, N \cdot m$ (71 - 97 lb in).



20100798 4



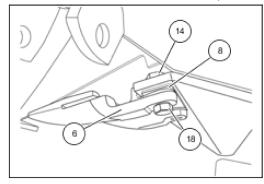
66060617 5

Reference	Description	Quantity
1	Adjustable Hold-down	72
2	Stud Plate	33
3	Stud Plate	2
4	Double Guard Stub	35
5	Special Guard Right-Hand	1
6	Special Guard Left-Hand	1
7	Clip	13
8	Shim, 0.120 in	50
9	Shim, 0.187 in	2
10	Shim, 3 Cutouts, 0.010 in	6
11	Shim, 2 Cutouts	66
12	Shim, 0.120 in	19
13	Shim, 0.120 in	1
14	Nut, G5, 7/16 in	74
15	Nut, Lock, GC, 3/8 in	72

16	Bolt, Carriage, G5, 7/16 in-14 x 2-1/2 in	59
17	Bolt, Carriage, G5, 7/16 in-14 x 2-3/4 in	13
18	Screw, Cap, HH, G5, 7/16 in-14 x1-1/4 in	2
19	Filler, Rubber	72
20	Shim, 0.10 in	216
21	Spacer, OD - 22.5 \pm 0.5 mm (0.89 in \pm 0.019 in), ID - 13.5 \pm 0.4 mm (0.53 in \pm 0.015 in)	72

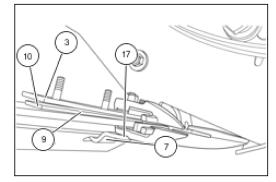
Certain areas will require a clip to hold the skid shoes or center wear plate. In this case a new clip and a **7/16** in \times **2-3/4** in carriage bolt is required in place of the common **7/16** in \times **2-1/2** in carriage bolt.

- Left-Hand Guard (6)
- Shim, **0.120 in** thick **(8)**
- Bolt, **7/16 in** x **1-1/4 in (18)**
- Nut, **7/16 in (14)**



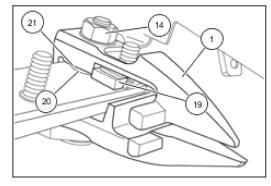
86060620 6

- Carriage Bolt, 7/16 in x 2-3/4 in (17)
- Clip (7)
- Shim, **0.187 in** thick (3 hole)
- Three shims, **0.010 in** thick (3x) **(10)**
- Stud plate, three studs (3)



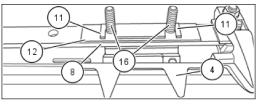
86060621 7

- Filler, Rubber (19)
- Spacer (21)
- Three Shims, **0.010 in (20)**
- Adjustable hold down (1)
- Nut, **7/16 in (14)**



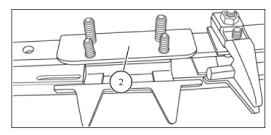
86060622 8

- Double guard stub (4)
- Two carriage bolts, **7/16 in** × **2-1/2 in (16)**
- Shim, **0.120 in** thick **(8)**
- Shim, **0.120 in** thick **(12)**
- Two shims, **0.010 in** thick **(11)**



86060624 9

Stud plate, two studs (2)



86060633 10

(3)

20

Install rubber filler (1) around each stud with the open end facing forward.

Two fillers, Rubber (19)

Install one spacer (2) onto each carriage bolt (3) followed by three washer shims (4)

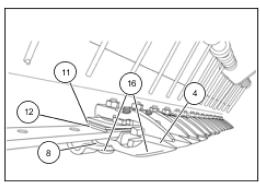
- Two spacers (21)
- Six shims, **0.010 in (20)**
- Two Adjustable hold downs (1)
- Two nuts, 7/16 in (14)

14

86060625 11

86060626 12

- Double guard stub (4)
- Two carriage bolts, **7/16 in** x **2-1/2 in (16)**
- Shim, **0.120 in** thick **(8)**
- Two shims, Two shims, 0.120 in thick (12)
- Two shims, **0.010 in** thick **(11)**

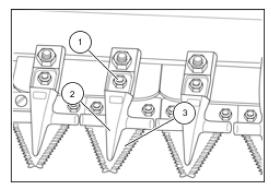


86060627 13

Install adjusting locknuts (1) on all hold downs (2) and adjust nuts to obtain **0.051 - 0.203 mm** (**0.002 - 0.008 in**) between the nose of the hold down and the knife section (3) (total clearance above and below the section).

• Lock nut, 3/8 in (1)

Repeat run time of five minutes and check temperatures. If temperatures are over **49 °C (120 °F)**, adjust the locknuts and/or shim as required.

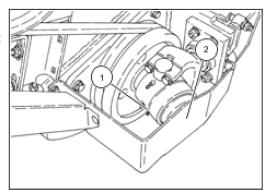


86060634 27

Sickle drive

Checking the wobble hub bearings

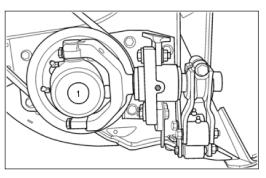
- Use a pry bar and try to move the hub (1) on the wobble box shaft.
- 2. If the hub moves, remove the shield (2).
- 3. Clean the area to prevent contamination.



20022832 1

- 4. Remove the grease cap (1).
- Tighten the locking nut to 200 N·m (150 lb ft). Use a punch.
- 6. If the bearings are still loose, they require replacement.
- 7. Check the wobble hub bearings on the other side of the unit.

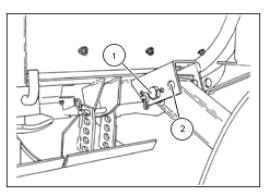
Several special tools are required to repair the wobble box.



10024148 2

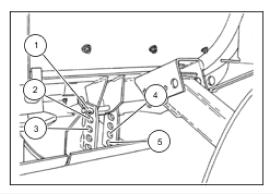
Cutting height

The cutting height is adjustable from **30 - 157 mm** (**1.2 - 6.2 in**). The position of the skid shoes and the length of the top link (header tilt) control the stubble length. Lower the skid shoes and/or shorten the top link or tilt cylinder for a longer stub ble. Raise the skid shoes and/or lengthen the top link or tilt cylinder for a shorter stubble. The skid shoes have five positions. The header tilt will also change the cutting height. With the lift bushings in the forward position (1) the tilt angle can be adjusted between 0 - 6 °. With the lift bushings in the rear position (2) the tilt can be adjusted between 6 - 12 °



20100786

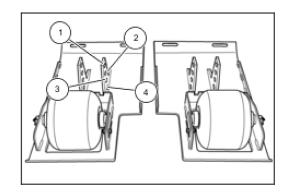
IMPORTANT: When operating in stony or sandy fields, place the lift spacer in the forward position to flatten the guard angle. This will reduce the amount of stones or sand that is scooped into the header. Adjust the skid shoes or gauge wheels for a longer stubble.



With skid shoes

CUTTING HEIGHT AND GUARD ANGLE				
vs				
	SKID SHO	E AND TOP LINK LENGTH		
SHOE POSITION	LINK LENGTH	GUARD ANGLE (DEGREES)	CUTTING HEIGHT	
1st Hole*	457 mm (18 in)	12.1	31 mm (1.2 in)	
	357 mm (14 in)	7.0	48 mm (1.9 in)	
2nd Hole	457 mm (18 in)	11.9	41 mm (1.6 in)	
	357 mm (14 in)	6.7	71 mm (2.8 in)	
3rd Hole	457 mm (18 in)	11.5	65 mm (2.6 in)	
	357 mm (14 in)	5.8	98 mm (3.9 in)	
4th Hole	457 mm (18 in)	11.0	92 mm (3.6 in)	
	357 mm (14 in)	5.8	127 mm (5.0 in)	
5th Hole	457 mm (18 in)	10.4	121 mm (4.8 in)	
	357 mm (14 in)	5.3	157 mm (6.2 in) *	

^{*}It is not recommended to operate at steeper than midrange guard angle in the lowest shoe setting or the shoes will wear prematurely.



With ontional gauge wheels

CUTTING HEIGHT AND GUARD ANGLE VS						
GAUGE WHEEL POSITION AND TOP LINK LENGTH						
GAUGE WHEEL POSITION LINK LENGTH GUARD ANGLE (DEGREES) CUTTING HEIGHT						
1st Hole*	457 mm (18 in)	12.1	30 mm (1.2 in)			
	357 mm (14 in)	6.8	62 mm (2.4 in)			
2nd Hole	457 mm (18 in)	11.6	57 mm (2.2 in)			
	357 mm (14 in)	5.9	121 mm (4.8 in)			
3rd Hole	457 mm (18 in)	10.4	119 mm (4.7 in)			
	357 mm (14 in)	4.8	182 mm (7.1 in)			
4th Hole	457 mm (18 in)	9.1	183 mm (7.2 in)			
	357 mm (14 in)	3.7	243 mm (9.5 in) *			

Skid shoes or gauge wheels

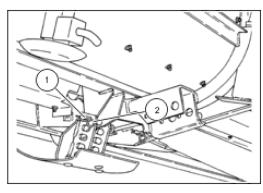
M WARNING

- 1. Disengage all drives.
- 2. Engage parking brake.
- 3. Lower all attachments to the ground, or raise and engage all safety locks.
- 4. Shut off engine.
- 5. Remove key from key switch.
- 6. Switch off battery key, if installed.
- 7. Wait for all machine movement to stop.

Failure to comply could result in death or serious injury.

Remove hairpin cotter (1) and drilled pin (2). Move the back of the skid shoe up or down to your selected position. Install the drilled pin. Replace the hairpin cotter. Move the other skid shoes or gauge wheels to the same position.

IMPORTANT: Adjust the header flotation after changing the position of the skid shoes.

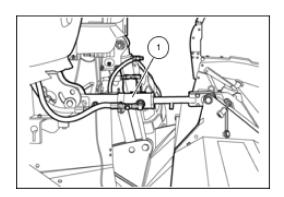


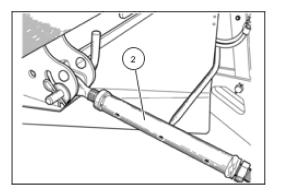
20100787 1

W0047A

Tilt cylinder or link

Use the tilt cylinder (1) or link (2) to make the final height adjustment.





Sickle Cutter bar flotation

Adjust sikle cutter bar floation to about 23-32 kg (50-70 lbs).

NOTE: The cutter bar flotation should be checked and adjusted when using tractors with different draw bar heights, or when changing cutting height.

Disc Cutter bar flotation

A DANGER

Crushing hazard!

Safety locks built into the header lift system lock the header in the raised position. Engage the safety locks on both sides before working under a raised header. Failure to comply will result in death or serious injury.

NOTE: The cutter bar flotation should be checked and adjusted when using tractors with different draw bar heights, or when changing cutting height.

The cutter bar flotation is controlled by flotation springs (1) at each end of the header.

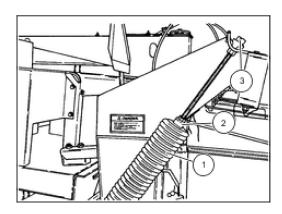
Adjust the cutter bar flotation for about **45 - 54 kg** (**99 - 119 lb**) at each end of the Disc header if operating in rocky fields at lower 5-8 km/h (3-5 mph) ground speeds. If the disc mower conditioner is to be operated in relatively smooth fields at higher) ground speeds, it may be necessary to adjust the flotation to obtain **59-68 kg** (**130 -150 lb**) weight on either end of the header to prevent excessive header bounce.

NOTE: The cutter bar flotation should be checked with the tongue position ed on each side of the header. The header weight should be adjusted so that the head stays on the ground.

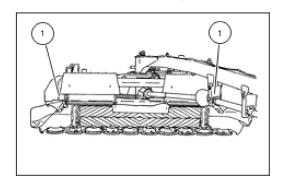
Loosen the jam nuts (2) . Turn adjusting bolts (3) as required. Check flotation with the header centered behind the tractor, lowered to the ground, and tilted for the desired cutting height. Raise the cutter bar shields and lift on the left and right end supports (1). Operating with heavier than necessary weight results in side draft and excessive wear to cutter bar components. If the header is too light, long stubble results when the header does not quickly return to ground level after crossing a bump.

NOTE: Check flotation frequently, because crop and dirt buildup can cause the flotation force to change.

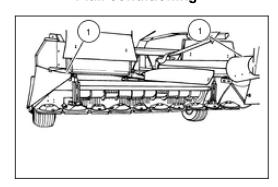
NOTE: Check flotation in the field operating position(s).



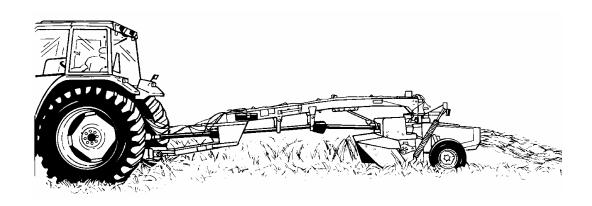
Roll conditioning



Flail conditioning



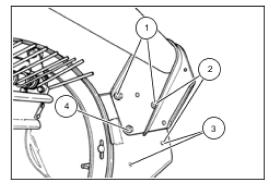
Disc and Sickle Mower Conditioners Technical Training



Reel and Auger Operation

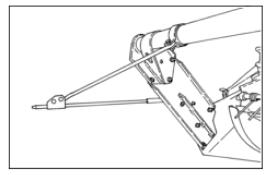
Push bar

The push bar can be adjusted for different crop heights. Normally for tall crops the push bar would be placed in the upper position (1) and for short crops in the lower position (3). The mid-position holes (2) would be used for medium height crops (there are two possible "Mid" positions). To adjust the push bar, loosen the pivot bolt (4) and remove bolts (1) on each end of the header. Move the push bar to the desired location, install and tighten the bolts.



20100788 1

Cane crops may require push bar extensions. These extensions are for use with self propelled units only, and can be ordered through service parts. **IMPORTANT:** These extensions should not be used on pull-type applications, as the push bar will contact the tongue of the pull-type unit when the header is raised.

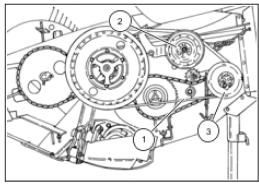


20024196 2

Reel speed

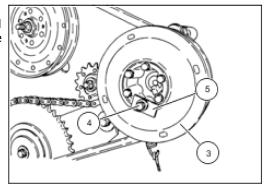
The reel speed for most crops should be slightly faster than the ground speed. The reel can also be adjusted for abnormal crop conditions. The reel variable sheave is assembled at the factory for a reel speed of 70 RPM. This setting should be acceptable for most crop conditions. To change the reel speed:

- 1. Remove the spring tension from the idler (2).
- 2. Remove the drive belt (1) from the drive pulley (3).



20022835 1

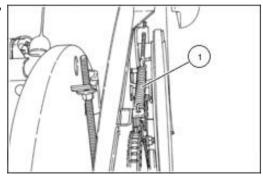
- 3. Remove the cap screw (4) and clip (5).
- 4. Rotate the outer sheave half (3) outward to increase the speed or inward to decrease the speed. The sheave must be rotated one full turn to align the pin hole in the threads. The outer sheave half can also be removed, reversed and installed to change the sheave size. See the reel speed chart to determine the speeds available.
- 5. Install a lock washer, a flat washer and then the clip on the cap screw. Use lock washers as required to eliminate any bending load on the clip (the washers must be further out than the outer sheave.)
- 6. Install the belt.



20022839 2

IMPORTANT: Do not turn the sheave half out past the flush position or the drive belt will be damaged.

Apply the spring load to the idler. The spring length (1) must be 200 mm (8 in).



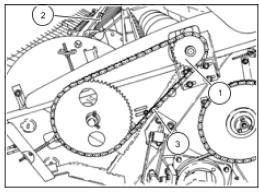
20022841 3

Reel speed (variable hydraulic control)

Variable hydraulic reel drive is available as optional equipment for windrower applications only. A hydraulic motor (1) drives the reel (2) with a chain (3).

The electric controller in the cab allows the operator to control the speed of the reel with a variable rotary knob.

The reel speed for most crops should be faster than the ground speed.

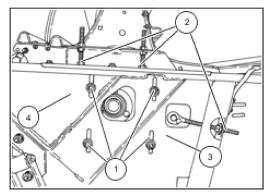


20022846

Reel position

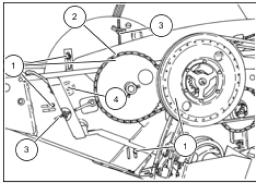
The reel is set in the best position for most crops when the machine is built. The reel can be moved up or down for other crop conditions. A chart that shows machine settings for certain crop conditions is at the end of this section.

To change the reel position on the right side, loosen the four bolts at **(1)** and use the adjusting bolts**(2)** to move the reel up/down and front/rear. To return to the factory set position, align the hole **(3)** in the side sheet and reel plate, and align the hole**(4)** with the reel plate slot.



20022837

To change the reel position on the left side, loosen bolts (1) that hold the cam plate to the side sheet. Also loosen the pivot plate bolt (2) behind the shield. The reel can now be moved up/down or front/rear by using the adjusting bolts (3). To return to the factory set position, align the hole (4) with reel plate hole. Normally the tines clear the top of the guards by about 19mm (3/4 in)If the cutter bar plugs, lower the reel so the tines are closer to the guards. Make sure both ends of the reel are adjusted the same distance from the guards.

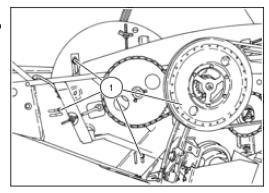


20022836

Reel timing

The reel tines must pick up the crop and release it at the proper time. Faster reel speeds may require earlier release of the material to reduce crop carryover. Releasing the material later may result in more even feeding of the material to the auger.

With the left side bolts (1) loose, rotate the cam plate clockwise to release the material sooner, or counterclockwise to release it later. After the reel position and timing have been changed, tighten the bolts. Rotate the reel through one revolution to be sure there is no interference.

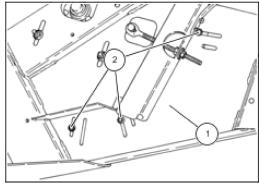


20022836 1

IMPORTANT: If the reel is moved, move the anti-wrap shield (1) at the slotted holes (2). There should be 12 mm (1/2 in) clearance between the shield and the reel.

IMPORTANT: After changing the reel position and timing, tighten all bolts and jam nuts. Rotate the reel by hand to be sure there is no interference. The arms welded to the tine bars must clear the cam track by **3 - 10 mm** (**1/8 - 3/8 in**).

IMPORTANT: If the reel position is changed, check the tension of the reel drive chain. Adjust the chain, a force of **7 kg** (**15 lb**) applied to the center of the chain must deflect the chain **6 mm** (**1/4 in**).



20022840 2

Auger height

The auger has a floating range of **64 mm (2-1/2 in)** with auger height at factory setting. Auger stops on the header side sheets can be moved up or down to adjust the clearance between the auger flighting and the auger strippers on the inside of the header.

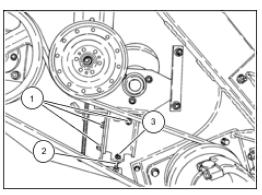
The factory sets the clearance at **1.6 - 3.2 mm** (**1/16 - 1/8 in**). Adjustments can be made by loosening the hardware at **(1)** on each end of the auger and repositioning the stops with the adjusting bolt **(2)**. **NOTE:** Shield removed for clarity.

- 1. Adjustments can be made by loosening the hardware **(1)** on each end of the auger.
- 2. Loosen the jam nut (3) and using a wrench, adjust the stop (2) either up or down.
- 3. After reaching the desired height, tighten the jam nut (3).
- 4. Tighten the nuts on the carriage bolts (1).

In most crop conditions this setting is adequate, although in very light crop conditions it may be necessary to set the clearance as close as possible without rubbing the strippers.

NOTE: The strippers can also be shimmed with washers to compensate for wear at the inner ends.

In cane crops, first set the clearance as close as possible. If the crop is not feeding well, however, it may be beneficial to raise the auger as high as possible.

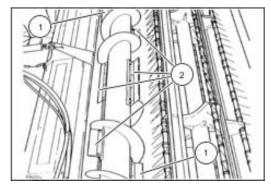


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Auger paddles

There are six bolt-on paddles **(1)** and **(2)** on the 12HS and 14HS headers, and four paddles **(2)** on the 16HS and 18HS headers. These paddles are positioned on the auger to feed crop into the conditioner. It may be necessary to install or remove paddles to distribute crop more evenly in different crops or when changing to different windrow or swath widths. Removing the outside paddles will narrow the windrow and even out the center of the windrow in light crop conditions.

First set the desired windrow or swath width. If the crop is not distributed evenly, remove or install paddles as necessary. Always remove or install a pair of paddles. If the end paddle (1) is removed from one side, then the end paddle (1) should be removed from the other end, etc.

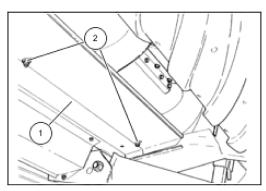


20100789 1

Header floor pan

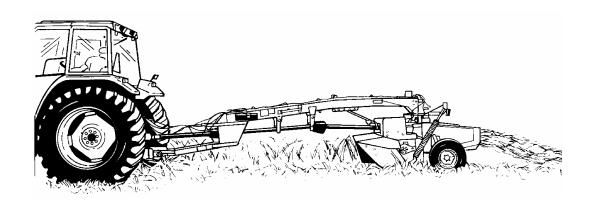
A three-position floor pan **(1)** behind the auger and in front of the conditioner rolls can be positioned to allow rocks to fall through the opening before they reach the rolls.

To reposition the floor pan, remove the five cap screws, 2, securing the floor pan to the header frame. Reposition the pan and reinstall the cap screws. **NOTE:** When mowing light crop or making narrow windrows with the floor pan fully forward, crop may drop to the outside of the windrow.



20100790 1

Disc and Sickle Mower Conditioners Technical Training



Crop Conditioning

Properly conditioned crop

Properly conditioned crops will show a pattern of cracks at regular intervals along the plant stem. Each crack will be about 25 - 50 mm (1 - 2 in) in length. The stem should look flat in these cracked areas. Depending on crop height when cut, there will be at least two or three cracks along the plant length. The plant leaves should show only minimal bruising. Leaf bruising is characterized by dark green streaks or marks across the leaf surface. While some leaf bruising can't be avoided, too much bruising is not good because the bruises allow moisture to escape the leaf. When this occurs, the leaf dries too quickly, resulting in loss of the plant leaf before or during packaging. This in turn reduces the overall feed value of the crop.

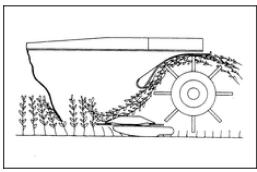
Theory of operation

Flail conditioning system

The flail conditioning consists of a single fixed mounting rotor assembly that carries free swinging cast gangs of flails and an adjustable conditioning hood. As the crop passes through the opening between the rotor and the hood, the action of the crop rubbing against the flails and hood combine to scuff the crop stems, stripping the waxy coating from the stem and allowing moisture to escape.

Conditioning level is determined by the amount of clearance between the flails and conditioning hood, flail rotor speed and the type of hood liner.

Moving the hood closer to the flails increases the conditioning. Moving the hood away from the flails decreases conditioning.



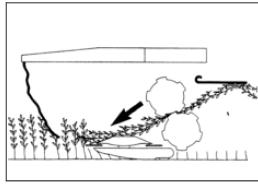
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Roll conditioning system

Roll conditioning passes the cut crop through a set of closely spaced intermeshing rolls with matching lands and valleys. The rolls crush and crack the plant stem at several points along its length, which wears away the waxy coating and allows moisture to escape.

- There are two rolls in roll conditioning.
- The lower roll is fixed in the machine.
- The upper roll can pivot to let the crop mat feed through the rolls without plugging.
- Roll gap and roll tension affect crop conditioning.



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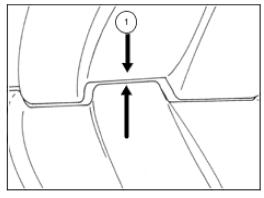
Roll gap

The roll gap is the space between the land of one roll and valley of the opposite conditioning roll. The roll gap should be **0.4 - 3 mm** (**1/64 - 1/8 in**) **(1)**

IMPORTANT: The rubber rolls must never touch each other. This creates a vibration that could cause damage to the machine.

To check the roll gap easily and quickly in the field, use the "one stem method." Take one stem of the crop being cut and pass it between the rolls at three or four points across the roll width. The stem should move between the rolls, but with some resistance. If the stem passes through the gap with little or no resistance, the gap should be reset closer. If you cannot pass the stem between the rolls at all, the gap should be increased slightly. To get peak machine performance and efficiency, check the roll gap before each cutting during the season, and also when cutting different forage crops because each crop will be different.

In high volume crops like Sudan grass and other cane-type crops, increase the roll gap slightly to get better crop flow through the rolls without sacrificing good crop conditioning.



50051187 1

Roll tension

After setting the roll gap, adjust the roll tension. Roll tension is the amount of pressure added to restrict upper roll movement as the crop feeds through the rolls. Hard-to-condition crops require more tension. Light and easily-conditioned crops require less tension. Higher roll tensions increase the pressure exerted on the crop mat as it moves between the lands and valleys, increasing the ability of the rolls to crack and wear the stem's waxy coating away. Higher roll tensions result in more aggressive crop conditioning because the rolls become more resistant to spreading apart as the crop is fed through.

Torsion bar tensioning system

The torsion bar tensioning system maintains uniform pressure throughout the range of roll movement as the crop mat passes through, providing better control and reducing potential crop plugging. In most conditions, a good starting point for tension on intermeshing rolls is to increase the roll tension by turning the adjusting crank 8 full turns after you start to feel resistance on the crank handle.

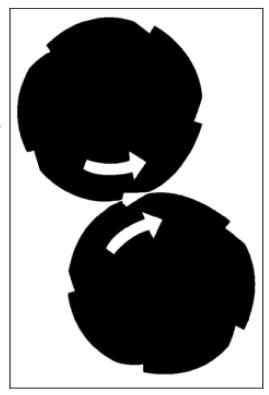
Too large a roll gap or too little roll tension under-conditions the crop, resulting in extended dry down times and increased potential for weather-related damage. Too close a roll gap or too much roll tension can severely over-condition the crop, breaking the tops away from the plants and causing excessive leaf loss. It can also cause excessive wear of the conditioning rolls if they touch while turning.

Checking crop

As a general check, grab a handful of crop directly behind the machine after it has been processed and hold it in one hand. The plant stems should be fairly limp and just fold over your hand. Nine out of 10 stems in a random sample should show stem cracks. Inspect the leaves in the same random sample, and no more than **5** % of the leaves should have bruising.

High-Contact conditioning rolls

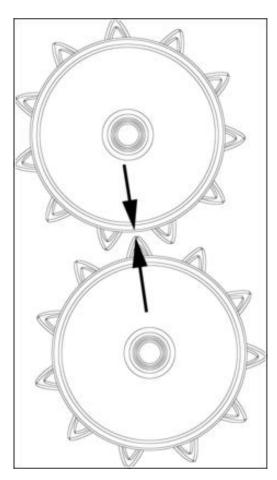
High-contact Chevron conditioning rolls are designed to decrease dry-down time and increase hay quality in alfalfa and other legume crops by crushing the entire length of the stem, while causing minimal damage to leaves. The crushed plant stems dry faster than stems that are not conditioned or are only crimped. An additional benefit is that the hay feels softer in the bale. Like all other forms of roll conditioning, best conditioning performance is a function of a combination of roll pressure and clearance between the rolls. Some clearance is required to prevent tearing leaves and tips off the crop stems. Too much clearance between the roils will not allow the crop stems to be crushed. Roll pressure is also required to crush the stems and allow the crop to dry uniformly. Too much pressure will cause over conditioning and excessive leaf damage.



Steel roll conditioning

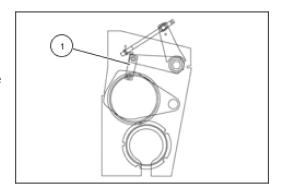
The steel conditioning rolls are used in hard, large stalk materials, such as cane. The steel rolls will not wear as fast as the rubber rolls. The roll gap for The steel conditioning rolls are used in hard, large stalk materials, such as Sudex and Sudan grasses.

Steel rolls should be adjusted to 5 -10 mm (0.20 - 0.39 in) 3/16-3/8".



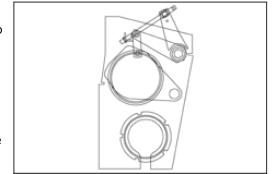
Rolls in home position

Rolls are at **0** °(home position). Link(**1**) is straight. This allows full pressure of torsion bar to be applied to top roll arm.



Rolls open at 15 degrees

Rolls begin to open as crop enters conditioning system. Link starts to bend to rear while torsion bar maintains conditioning pressure.



Rolls fully open at 27.3 degrees

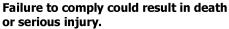
Rolls are now fully open due to crop slug or foreign object entering rolls. The link between torsion bar and top roll arm is no longer applying direct pressure to roll arm. Rolls are against stop link back with conditioning pressure now removed. Rolls will return to former position (with preset conditioning pressure) when object or slug passes through.



AWARNING

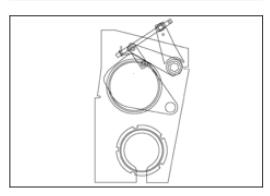
Avoid injury! Always do the following before lubricating, maintaining, or servicing the machine.

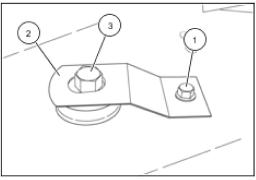
- 1. Disengage all drives.
- 2. Engage parking brake.
- 3. Lower all attachments to the ground, or raise and engage all safety locks.
- 4. Shut off engine.
- 5. Remove key from key switch.
- 6. Switch off battery key, if installed.
- 7. Wait for all machine movement to stop.



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To adjust the conditioner roll gap, loosen the bolt (1) on either side of the deck. Lift the end of the spring lock (2). Rotate the spring lock away from the adjusting bolt (3). The adjusting bolt will change the conditioner roll gap by 1.6 mm (1/16 in) per revolution. The same adjustment must be made on the other side of the sickle header.





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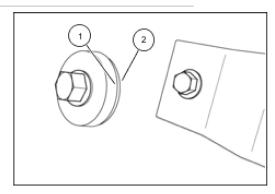
NOTE: Mark the bolt head **(1)** and the deck **(2)** to aid in making the same adjustments on both sides.

Under most crop conditions the roll gap should be maintained as close as possible, usually **0.4 - 3 mm (1/64 - 1/8 in)**. The rolls must not touch each other. In certain cane type crops like Sorghum, Sudex or Sudan grasses, it may be necessary to increase the conditioner roll gap to approximately 13 mm (1/2 in) or greater in order to feed the crop through the conditioning of the stalks.

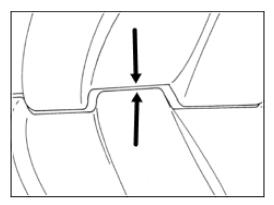
Use a feeler gauge from behind the header to measure the gap.

IMPORTANT: After adjustment, rotate the conditioner rolls by hand; they should never touch. Repeat previous procedure if they contact.

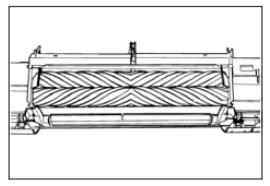
Header vibration and prematurewear will occure.



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AWARNING

Avoid injury! Always do the following before lubricating, maintaining, or servicing the machine.

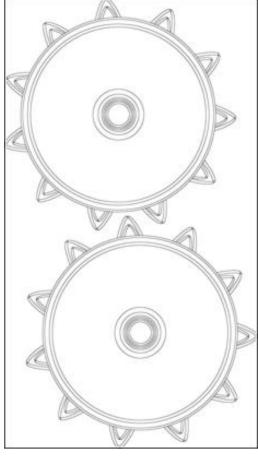
- 1. Disengage all drives.
- 2. Engage parking brake.
- 3. Lower all attachments to the ground, or raise and engage all safety locks.
- 4. Shut off engine.
- 5. Remove key from key switch.
- 6. Switch off battery key, if installed.
- 7. Wait for all machine movement to stop.

Steel roll gap

The roll gap between steel rolls should be:

5 - 10 mm (0.20 - 0.39 in) 3/16-3/8".

Measure the gap through the hole in the side sheet.

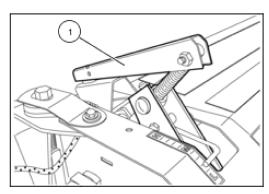


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Conditioner roll pressure (rubber and steel rolls)

The roll pressure is adjusted with the crank (1) on the left end of the disc header. To change the pressure, pull the end of the crank up to remove the spring clip from the deck. Rotate the crank clockwise to decrease the pressure.

After making an adjustment, snap the spring clip back into the deck. Adjust pressure according to crop conditions. Use only enough pressure to break the stems with minimal damage to the leaves. A good rule of thumb is that **90** % of the stems show evidence of being broken, with no more than **5** % damage to the leaves. Over conditioning will cause dry leaves to shatter, increase power requirements, and accelerate drive component wear. Under conditioning will require increased drying time. The factory setting is ten turns from slack.



86082782 1

High - contact roll gap and pressure adjustment

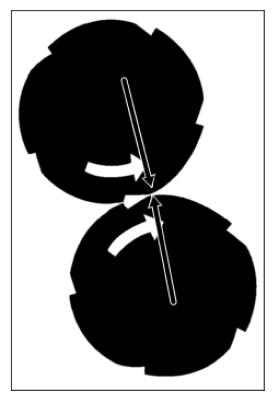
For best results with high-contact conditioning rolls, it is recommended to adjust the roll gap to:

0.8 - 1.6 mm (1/32 - 1/16 in) (1). This adjustment can be accomplished without measurement by following these steps:

- Loosen the adjusting nut until there is slack in he adjusting bolt (the top roll is resting on the lower roll).
- Remove the slack in the bolts, then turn each nut an additional 1/3 to 2/3 revolution. One turn of the adjustment nut equals approximately 2.4 mm (**3/32 in**) change in gap.

Next, adjust the roll pressure to five turns from slack, Begin harvesting, and inspect the crop that has been expelled from the conditioner. If the crop is being damaged, or more than **10** % of the leaves or stems are torn, increase the clearance between the rolls until less than 10 % of the leaves or stems are torn. Then increase the roll pressure until the stems are crushed and limp when inspected.

As a rule of thumb, fine-stemmed crops will require less clearance between the rolls, while thicker- stemmed crops will require more clearance. Tough-stemmed, more mature crop will require more pressure than young, tender crops. Decreasing roll pressure generally improves crop feeding and reduces horsepower requirements as well.



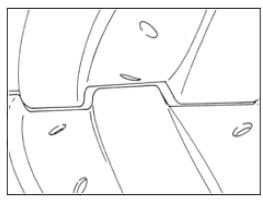
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Conditioner roll timing

Rubber rolls

Rubber lugs on one conditioner roll must be timed or meshed correctly with the lugs on the other roll. If the timing is wrong, there will be vibration. Damage to the rolls, roll drives, or header side sheets could result. The crop could also be over conditioned.

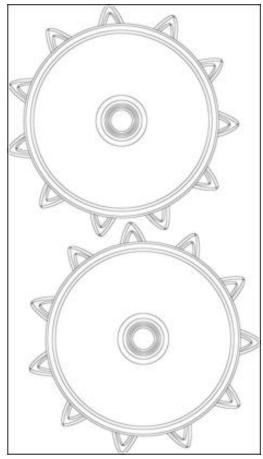
If roll timing is correct, the lugs on the top roll will be centered within the lugs of the bottom roll. Lugs must not touch each other.



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Steel rolls

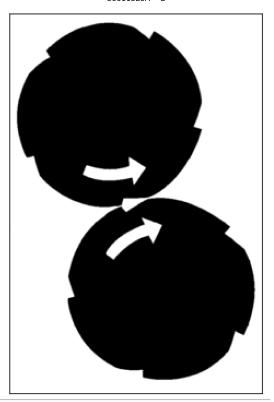
Center the lower roll lug in the upper roll valley, while applying hand force on the upper roll in the direction opposite the normal rotation. Tighten the four bolts and washers at the lower drive shaft yoke flange, and recheck the timing by applying reverse rotational force on both rolls.



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High-contact rolls

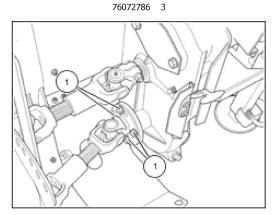
Adjust the roll timing so that the chevron grooves are timed on top of each other as shown. This timing will provide maximum feeding performance and maximum crush of the stems.



Timing adjustment

If the roll timing is not correct, loosen the four bolts **(1)** on the lower roll drive shaft (right side of header). Then center the lower roll lug in the top roll lug gap while applying hand force on the top roll in the direction opposite normal rotation. Tighten the four bolts, then check the timing by applying reverse rotational force on both rolls.

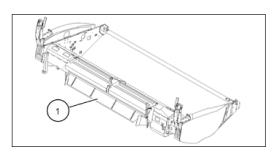
If this does not give you enough adjustment, you can move the U-joint on the gear box shaft one spline.



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Swath gate

The swath gate (1) is located directly behind the conditioner rolls.



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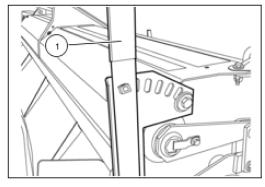
Adjust the swath gate with the handle (1) on the right side of the header to any of six locations.

For maximum swath width, position the gate down, handle to the rear. For windrowing, position the gate up, handle forward, to allow crop to pass to and through the windrow shields. Intermediate swath widths can be made by using intermediate positions.

When windrowing, use a combination of swath gate setting and windrow shield opening to give the most even material distribution for existing crop conditions.

NOTE: Auger paddles can also be removed or installed to achieve optimum crop distribution.

IMPORTANT: In its highest position, the swathgate may contact the windrower's tilt cylinder mount when in maximum tilt.



86082783 2

Field and crop conditions related to machine settings

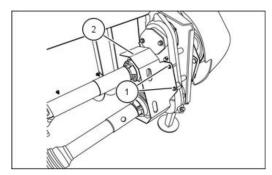
	Rocky	Light Standing	Heavy Standing	Down Lodged	Plugging Guards	Bunchy Windrows	Cane Crop
Auger Height	Normal	Normal	Normal	Normal	Normal	As close as possible	Down close, Fully up, See A below
Auger Paddles	See B below						
Auger Strippers	Normal	Normal	Normal	Normal	Normal	As close as possible	Down close, Fully up, See A below

		•					
Conditioner Roll Gap	Wider if possible	Normal	Normal	Normal	Normal	Normal	Open as far as possible
Crop Divider			May be needed				Needed
Header Tilt	Back			Forward	Either way may help		Back
Push Bar		Down	Up - See C below	Down			Up - See C below
Reel Setting	Up	Rear	Up	Down and Forward	Down over guards	Down	Up and forward
Reel Speed	Normal	Normal to slower	Normal to slower	Slightly faster	Slightly faster	Slightly faster	Same as Ground speed
Reel Timing	Normal	Later	Normal	Later	Later	Early	Early
Skid Shoes	Down			Up	Either way may help		Down

- A. Sometimes in a cane crop it is better to have the auger to stripper clearance as close as possible and sometimes it is better to have the auger raised as high as possible. The type of cane and the volume will determine which is better. If the crop is not feeding into the conditioner rolls, try either setting.
- B. Paddles can be added or removed from the auger to aid in making a perfect windrow or swath. The determining factors for whether paddles should be added or removed are header width, volume of crop, and windrow or swath width. The **4.9 m** (**16 ft**) and **5.5 m** (**18 ft**) headers do not come with the two outside paddles. Because of the extra width of cut at the outer ends of the header, it is necessary to move the crop further into the center of the header for a uniform windrow or swath. Set the swath width you want and then remove or install paddles to get an even distribution of material.
- C. In some instances, lowering the push bar all the way down in very tall timothy or cane might help feeding. Reduce ground speed to prevent material from breaking over the lowered push bar, causing reel wrappage and plugging.

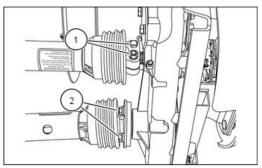
Roll drive system - Remove - Conditioner roll drive PTO shaft

1. Remove the hardware (1) securing the shield (2) to the gearbox.



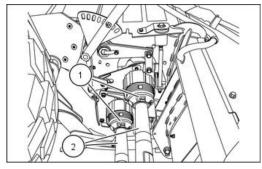
- 93107651 1

- 2. Remove the shield from the PTO shaft being removed by unlocking clip on PTO shield, slide the lock to disengage and slide sleeve inward.
- 3. Disconnect the upper or the lower conditioner roll drive PTO shafts from the conditioner drive gearbox by removing the two clamp bolts (1) on the upper drive shaft, or the four bolts (2) at the timing flange on the lower drive shaft.



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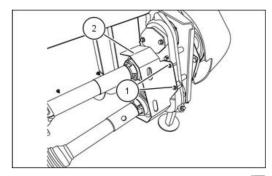
- 4. Remove the shield from the PTO shaft being removed by unlocking clip (1) on PTO shield, slide the lock to disengage and slide sleeve (2) inward.
- 5. Remove the hardware securing the PTO shaft to the conditioner roll shaft.





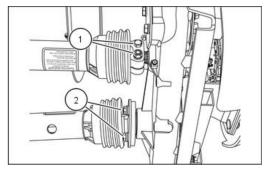
Roll - Remove - Lower conditioner roll

1. Remove the hardware (1) securing shield (2) to header.



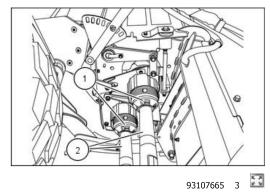
- 93107651 1

- 2. Unlock clip on PTO shield, slide the lock to disengage and slide sleeve inward.
- 3. Disconnect the upper and lower conditioner roll drive PTO shafts from the conditioner drive gearbox by removing the two clamp bolts (1) on the upper drive shaft, and the four bolts (2) at the timing flange on the lower drive shaft.



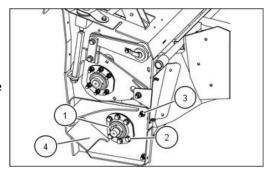
- 93107652 2

- 4. Unlock clip (1) on each PTO shield, slide the lock to disengage and slide sleeve (2) inward.
- 5. Remove the hardware, not shown, securing the PTO shaft to the conditioner roll shaft.



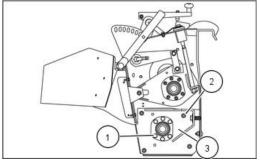


- 6. On the left side of the header, loosen the set screw and remove the lock collar (1) by driving it opposite to the direction of normal rotation.
- 7. Clean any rust, dirt or corrosion from the shaft using emery cloth. File down any marks left by the lock collar set screw.
- 8. On the right side of the header, remove the lock collar from the shaft in the same manner.
- 9. Support the lower conditioner roll with a floor jack and appropriate blocking.
- 10. On the left side, remove the flangette nuts and the nuts (2) on the mount bracket covering the removal slot. Slide the bearing and bearing housing off the shaft.
- 11. Remove the hardware (3) securing the flangette housing (4) to the conditioner module frame.
- 12. On the right side of the header, remove the nuts (1) on the flangette and remove the flangette.
- 13. Clean any rust, dirt or corrosion off the shafts using emery cloth. File down any marks left by the locking collar setscrew.
- 14. Remove the hardware (2) securing the flangette housing (3) to the conditioner module frame.
- 15. Using the floor jack to support the conditioner roll, lower the left end of the roll out of the header through the slot in the conditioner frame. When the roll is clear of the frame, move the roll slightly to the side and so that the right side shaft comes out of the hole in the frame. Then lower the roll to the ground.



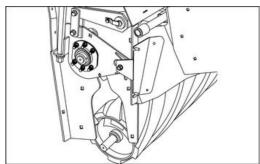
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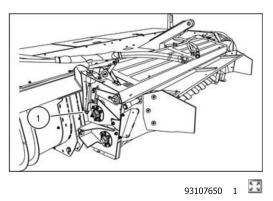


Roll - Remove - Upper conditioner roll

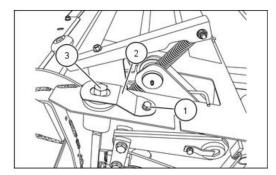
Prior operation:

Roll - Remove

1. Remove the nut (1) on the roll gap bolt.

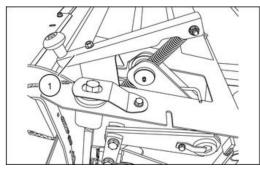


- 2. Loosen bolt **(1)** and raise the lock plate **(2)** and swing it out to the side. Lift the adjusting nut **(3)** and bolt out of the header.
- 3. Repeat steps $\underline{\mathbf{1}}$ and $\underline{\mathbf{2}}$ for other side.



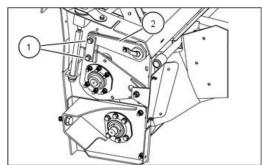
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4. Completely relieve the roll pressure by rotating the roll pressure handle **(1)** clockwise until tension is gone.



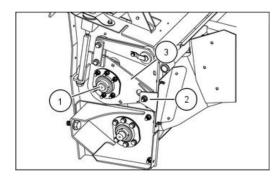


5. Remove the bolts (1) and spacer that connect the roll tension arm straps (2) to the pivot arm.



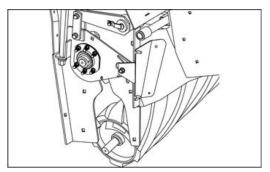
93110136 4

- 6. Loosen the set screw and remove the lock collar (1) by driving it opposite to the direction of rotation using a hammer and punch.
- 7. Remove the hardware (2) securing the roll conditioner arm (3) to the module. Slide the arm and bearing flangettes off the shaft.
- 8. Repeat steps **5** through **7** for the opposite side.



- 93110136 5

- 9. Support the roll using a floor jack and appropriate blocking. Remove the pivot nut and bolt from the left side pivot plate. Swing the pivot plate downward so it is clear of the mount. Slide the pivot plate and the bearing off the end of the roll.
- 10. Lower the left side of the roll through the slot in the header frame. Slide the right end out of the bearing and lower the roll to the ground.



Basic instructions - Conditioner roll gap adjustment

To adjust the conditioner roll gap, loosen the bolt (1) on either side of the deck with a **7/16 in** wrench. Lift the end of the spring lock (2). Rotate the spring lock away from the adjusting bolt (3). The adjusting bolt will change the conditioner roll gap by **1.6 mm** (**1/16 in**) per revolution. The same adjustment may be required on the other side of the disc header.

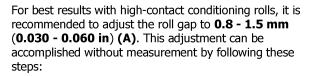
Under most crop conditions the roll gap should be maintained as close as possible usually **0.4 - 3 mm** (**1/64 - 1/8 in**) for rubber rolls.

Determine the high spot or maximum runout of each roll. Set the high spot of one roll against low spot of mating roll. Adjust to obtain **3 - 5 mm** (**1/8 - 3/16 in**) gap between for steel rolls.

NOTE: Be sure to lock the adjusting bolt after the adjustments are completed.

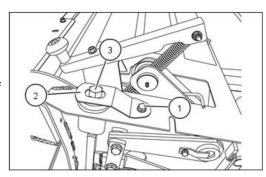
NOTICE: The conditioner rolls must not contact each other during operation or severe machine vibration will occur.

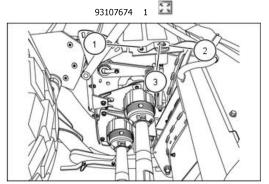
Occasionally inspect the conditioning rolls for material buildup. Remove accumulations that may be present to prevent roll contact, reducing conditioning effectiveness.



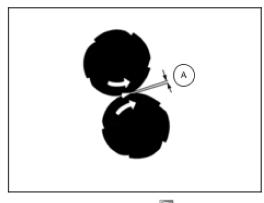
- Loosen the adjusting nut until there is slack in the adjusting bolt (the top roll is resting on the lower roll).
- Remove the slack in the bolts, then turn each nut an additional 1/3 to 2/3 revolution.
 One turn of the adjustment nut equals approximately 2.54 mm (0.100 in) change in gap.

Next adjust the roll pressure to 5 turns from slack. Begin harvesting and inspect the crop that has been expelled from the conditioner. If the crop is being damaged - > 10% of the leaves or stems are torn, increase the clearance between the rolls until < 10% of the leaves or stems are torn. Then increase the roll pressure until the stems are crushed and limp when inspected.



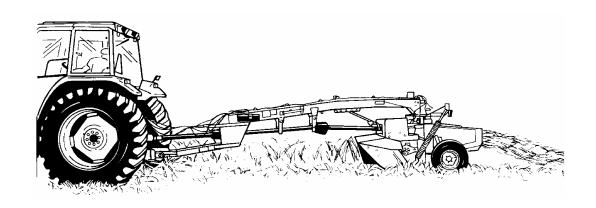






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Disc and Sickle Mower Conditioners Technical Training



Drives and Slip Clutches

Notes

SECTION 31 - IMPLEMENT POWER TAKE-OFF (PTO)

Chapter 2 - Slip Clutch

CONTENTS

Section	Description				
	Slip Clutch - Model 1411, Serial Number 614785 and Below	31-2			
	Slip Clutch - Model 1411, Including and Between Serial Number 614786 To 644147 Model 1412, Serial Number 646500 and Below				
	Slip Clutch - Model 1411, Serial Number 644148 and Above Model 1412, Serial Number 646501 and Above	31-19			
	Repair Time Schedule	. 31-24			

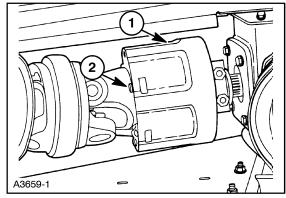
SLIP CLUTCH MODEL 1411, SERIAL NUMBER 614785 AND BELOW

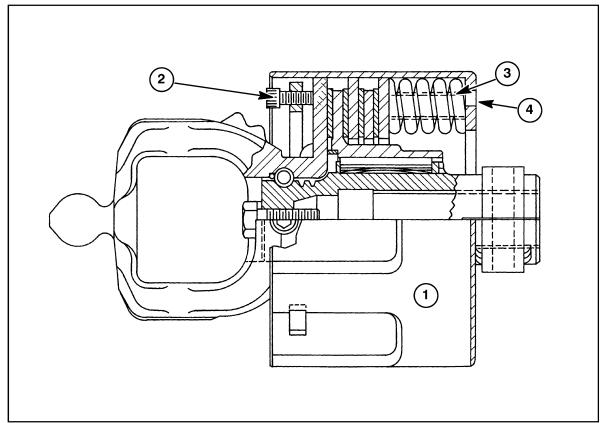
The slip clutch, 1, on the disc mower-conditioner is part of the secondary drive shaft assembly, and is mounted on the input shaft of the bevel gearbox. It is set to slip in the event an overload occurs during machine operation.

Prior to the start of each season, or after sitting more than 30 days, check the operation of the slip clutch to insure the clutch is not locked up.

To check the slip clutch:

- Loosen the six allen head (1/4") screws, 2, 1/2 turn at a time until two full turns have been made with each screw.
- Attach a tractor to the disc mower conditioner as outlined in the "General Information" section of this manual.
- Operate the tractor at 1/3 throttle, engage and disengage the tractor PTO. If the clutch does not slip, the clutch must be disassembled to unlock the friction discs. Consult your dealer for slip clutch service.





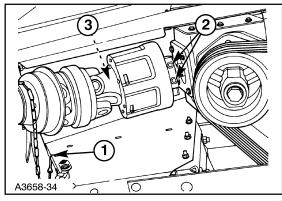
4. After slipping the clutch, it must be reset to the correct torque setting. The clutch torque is set with three spacers, 3, positioned inside three of the six clutch springs. The spacer and spring assemblies are positioned at the three holes, 4, at the rear of the clutch housing. Tighten the six allen head screws 1/2 turn at a time until the three allen head screws across from the holes, 4, bottom out. Tighten the remaining three allen head screws to the same height, then back all six allen head screws out 1/4 turn.

NOTE: The slip clutch is set at 610 N·m (450 ft. lbs.) (static) of breakaway torque. Do not alter the slip clutch setting or damage to the machine could result.

Slip Clutch - Removal

- Open the left side shield by unhooking the rubber straps, lifting the shield and swinging it open. If necessary, unhook the anti-rotation chain, 1, from the slot in the shielding.
- Remove the two cap screws, 2, and locknuts from the rear of the slip clutch assembly. Loosen the cap screw, 3, and lock washer inside the slip clutch yoke, but do not remove it. Tap the rear of the clutch housing with a soft faced hammer to remove it from the taper on the gearbox shaft; the center retaining bolt will prevent the clutch from falling off the shaft.
- Remove the center retaining bolt, 3, and slide the clutch assembly off of the gearbox input shaft.
 With both sections of the secondary drive shaft supported, slip the drive shaft apart to remove the slip clutch and rear section of the drive shaft.

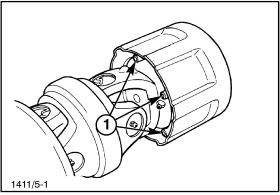
IMPORTANT: The slip clutch end of the secondary PTO shaft is very heavy and awkward; use caution not to drop the shaft assembly as personal injury or damage to the CV joint may result.



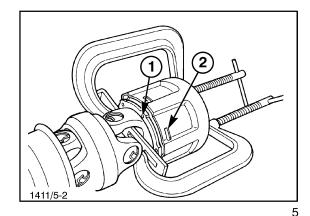
3

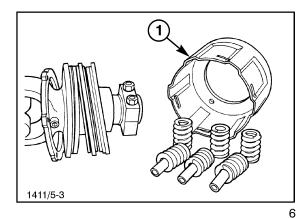
Slip Clutch - Disassembly

 Locate the six allen head screws, 1, in the lock ring on the clutch. Loosen the six screws evenly 1/2 turn at a time, until all screws are loosened.



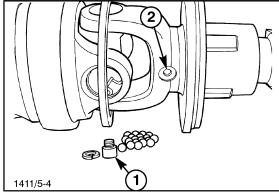
- 2. If the lock ring, 1, cannot be turned freely by hand, spring pressure is still being applied inside the clutch. Slip a bar (1/2" to 1" square x 9" long) through the yoke and center it. Attach C-clamps (8" minimum) across the length of the clutch on opposite sides, clamping between the bar and the rear of the clutch housing. Compress the clamps until the lock ring is loose.
- 3. Turn the lock ring until its tabs can slide out the clutch housing rails, 2. Use a screwdriver and hammer if necessary to tap the tabs into the rails.
- 4. Remove the two C-clamps and bar.
- Slide the clutch housing, 1, off of the clutch plates and friction discs. Separate the steel plates and friction discs, and slide them off of the outer overrunning clutch hub.





 To remove the disc between the outer overrunning clutch hub and the yoke flange, the overrunning clutch must be disassembled. Remove the cap screw, 1, in the yoke and spray penetrating fluid into the hole, 2, to remove the grease.

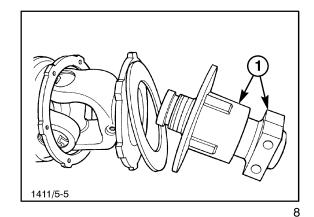
Rotate the hub in the yoke while holding the hole down until all the balls fall out; there are 20 balls in the overrunning clutch bearing.

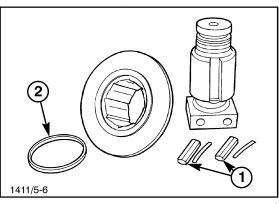


Slide the overrunning clutch inner and outer hubs, 1, away from the yoke flange; the friction disc may now be removed.

NOTE: If the slip clutch has been severely slipped, galling on the inner overrunning clutch hub may prevent the hub from being removed. In this case, it may be necessary to remove the slip clutch yoke from the 50 °CV U-joint, and press the inner hub out of the yoke.

7. The overrunning clutch hubs contain two sets of springs and dogs, 1, which operate the clutch. Separate the outer and inner hubs slowly, noting the orientation of these parts. Remove the grease seal, 2, from the outer overrunning clutch hub, and the O ring from the bore of the yoke





Slip Clutch - Inspection

flange.

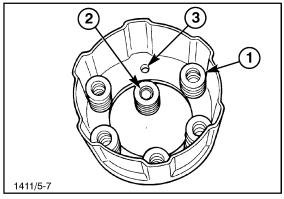
- Inspect the steel plates for discoloration or warpage; replace any damaged plates. Clean any rust from the plate surfaces with a wire brush or steel wool.
- 2. Discard all friction discs and springs. Do not discard the spring stops from inside the springs.
- 3. Inspect the overrunning clutch grease seal for melting or warpage. If this seal has signs of high temperature and is damaged, the components of the overrunning clutch are also damaged, and all parts must be replaced. When replacing the overrunning clutch ball bearings, wipe the ball raceways and O ring groove clean.
- 4. If the clutch has been severely overheated, inspect the overrunning clutch hubs and yoke for signs of galling or scoring. Clean the damaged areas with emery cloth if possible, or replace the components.

Slip Clutch - Reassembly

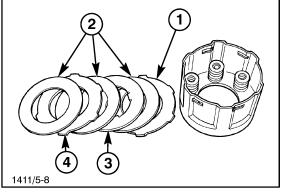
NOTE: During reassembly, it is necessary to carefully reassemble the overrunning clutch hubs to the yoke flange so the seal ring stays in place. If it moves even slightly it will leak grease into the first plate of the slip clutch, allowing the clutch to slip prematurely.

- 1. Position the clutch housing on a work bench. Stack the springs, 1, in the housing, positioning them at each rail in the housing. Install the three spring spacers, 2, into the springs positioned over the three holes, 3, in the housing.
- Stack the plates, friction discs, and outer hub of the overrunning clutch into the housing as follows:
 - external tooth plate, 1, splined into housing rails and down onto springs
 - friction disc, 2
 - internal tooth plate, 3
 - friction disc, 2
 - external tooth plate, 4
 - friction disc, 2

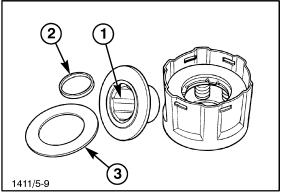
Apply a thin film of grease to the inner bore of the outer overrunning clutch hub, 1, and install it down through the plates and discs. Do not install the seal ring, 2, in the outer overrunning clutch hub yet. Position the remaining friction disc, 3, on top of the overrunning clutch hub.



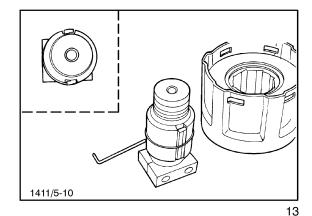
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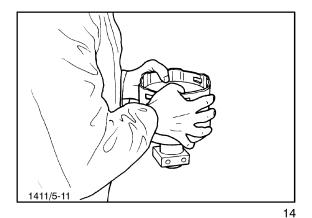
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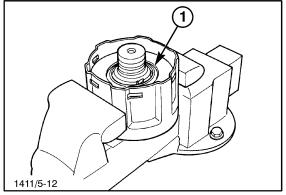
3. Preassemble the inner overrunning clutch hub by installing the leaf springs and clutch dogs, and use a rubber band to hold the components in place. The leaf springs should be installed with the ends down on the hub, and the curve facing up. Install the dogs so that the step is down on the spring, and is facing the direction of rotation (clockwise as viewed from the bearing end of the inner hub), as shown. Apply a thin film of grease to the overrunning clutch hub and dogs.



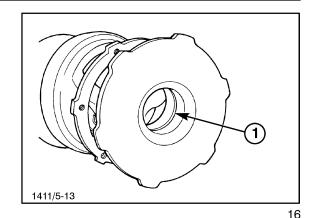
 Lift the slip clutch housing assembly and lower it down so the outer overrunning clutch hub fits over the assembled inner hub and dogs; remove the rubber band while sliding the components together.



- 5. Set the clutch assembly in a vise, positioning it with the inner overrunning clutch hub sitting on the vise screw or center of the vise. Lift the housing slightly so that the inner and outer overrunning clutch hubs are not fully seated together, and lightly clamp the housing in place.
- 6. Install the grease seal, 1, in the outer overrunning clutch hub, seating it in the groove.



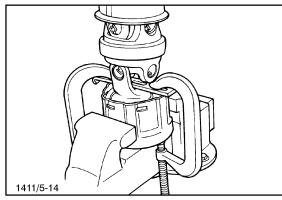
Install a new O ring into the groove, 1, in the yoke flange.



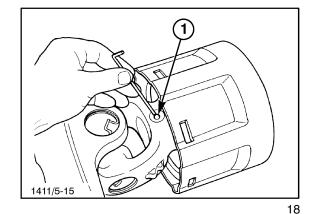
 Lift the shaft assembly vertical with the slip clutch yoke flange downward. Set it into the housing being careful not to disturb the grease seal. Align the tabs of the lock ring with the rails in the clutch housing.

NOTE: Be careful not to disturb the seal ring in the outer overrunning clutch hub. If it moves even slightly it will leak grease into the first plate of the slip clutch, allowing clutch to slip prematurely.

- 9. Hold the shaft straight up, and rotate the lock ring into the slots in the clutch housing if possible. If the lock ring cannot be rotated into the slots, it will be necessary to partially compress the clutch. Slip a bar (1/2" to 1" square x 9" long) through the yoke and center it. Attach C-clamps (8" minimum) across the length of the clutch on opposite sides, clamping between the bar and the rear of the clutch housing. Compress the clamps until the lock ring can be rotated into the slots in the clutch housing. Remove the C-clamps and bar.
- 10. Install six new allen head screws and tighten them slightly and evenly, while still holding the shaft upright. This will compress the clutch slightly to hold the clutch springs in position in the clutch housing. Remove the clutch and shaft assembly from the vise and lay it on a bench.

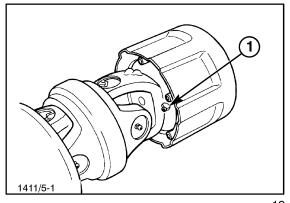


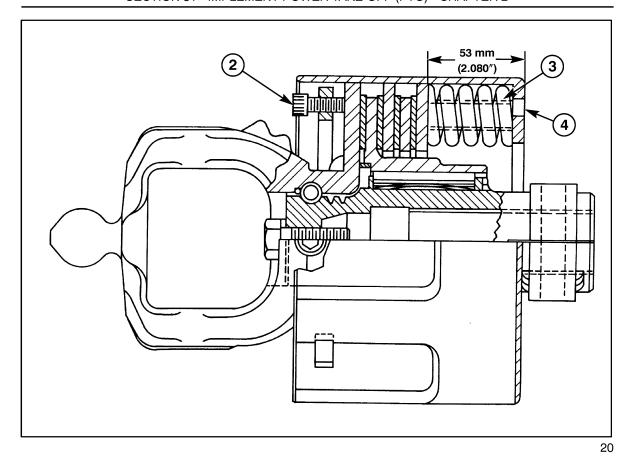
11. Rotate the inner hub of the overrunning clutch to ensure it still functions properly; if not, it can be removed to reposition the springs and dogs if necessary. After ensuring proper function, insert the inner hub fully into the yoke flange until the bearing groove in the inner hub aligns with the hole, 1, in the yoke. Drop the new ball bearings in through the hole into the bearing groove; there are 20 balls used. Reinstall the cap screw to retain the balls.



12. Grease the overrunning clutch bearing by pumping one or two shots of grease into the bearing grease zerk, 1, and then rotate the inner hub backwards so that it overruns. This will distribute the grease in the bearing. Repeat once or twice so that bearing is fully lubricated.

NOTE: Do not overgrease, as grease will be forced past grease seal into the clutch plates, causing premature clutch slippage.





13. Ensure that the springs are still properly positioned in the rails in the clutch housing; in addition, the three springs with spacers should be positioned at the holes, 4, in the housing for reference purposes. The clutch torque is set with the three spacers, 3, positioned inside the clutch springs. Tighten the six allen head screws 1/2 turn at a time until the three allen head screws across from the holes, 4, bottom out. Tighten the

remaining three allen head screws to the same

height, then back all six allen head screws out 1/4

turn.

To check for correct clutch spring adjustment, measure the distance from the back face of the clutch housing to the pressure plate, as indicated, at three different spots; the measurements should average 53 mm (2.080"). A difference of 0.5 mm (0.020") can have a significant effect on the breakaway torque setting; adjust the six allen head screws, 2, as necessary to obtain the correct dimension.

NOTE: The slip clutch is set at 610 N m (450 ft. lbs.) [static] of breakaway torque. Do not alter the slip clutch setting or damage to the machine could result.

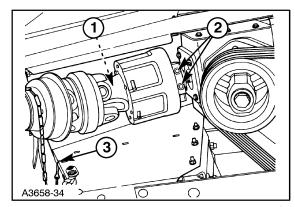
Slip Clutch - Installation

- Align the slip clutch and drive shaft assembly so that the two crimped splines align with the slot in the front half of the secondary drive shaft. Slide the two drive shaft halves together.
- 2. Slide the slip clutch onto the bevel gearbox input shaft as far as possible. Install the cap screw, 1, and lock washer into the slip clutch yoke, and thread it into the end of the shaft. Tighten the cap screw as much as possible to pull the slip clutch hub securely onto the tapered end of the gearbox shaft. Reinstall the two cap screws, 2, and locknuts; torque to 87 N·m (64 ft. lbs.).

NOTE: Do not overtorque; the locknuts are Class C, and are limited to 87 N·m (64 ft. lbs.).

IMPORTANT: The slip clutch end of the secondary PTO shaft is very heavy and awkward; use caution not to drop the shaft assembly as personal injury or damage to the CV joint may result.

3. Secure the PTO shielding anti-rotation chain to the slot in the shielding, 3.



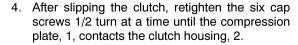
SLIP CLUTCH MODEL 1411, INCLUDING AND BETWEEN SERIAL NUMBER 614786 TO 644147 MODEL 1412, SERIAL NUMBER 646500 AND BELOW

The slip clutch, 1, on the mower-conditioner is part of the secondary PTO drive shaft, and is mounted on the input shaft of the bevel gearbox. It is set to slip in the event an overload occurs during machine operation.

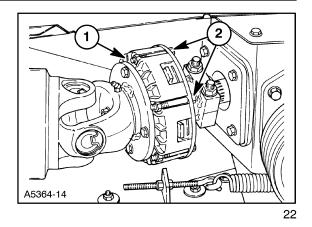
Prior to the start of each season and after long periods of nonuse, the slip clutch should be burnished to insure it is not locked up.

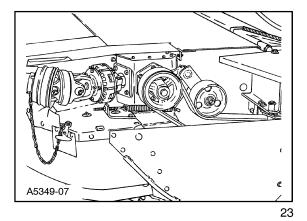
To burnish the slip clutch:

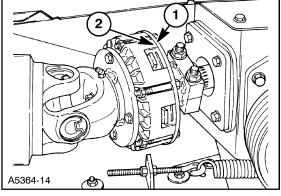
- 1. Ensure the tractor is shut off, if connected to unit. Loosen the six cap screws, 2, Figure 22, 1/2 turn at a time until cap screws are just loose, then retighten all six cap screws one half turn.
- 2. Attach a tractor to the disc mower-conditioner as outlined in the "General Information" section of this manual, if not already connected.
- 3. Operate the tractor at 1/3 throttle, and engage the tractor PTO for several seconds, or until the slip clutch visibly smokes, at which time, disengage the tractor PTO. Turn the tractor off. If the clutch does not slip, the clutch must be disassembled to unlock the friction discs. Consult your dealer for slip clutch service.



NOTE: The slip clutch is set at 1356 N·m (1000 ft. lbs.) of breakaway torque. Do not alter the slip clutch setting or damage to the machine could result.







Slip Clutch - Disassembly

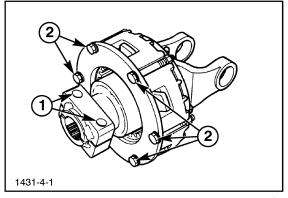
NOTE: Figures show slip clutch removed from secondary PTO shaft for clarity.

- 1. Remove the two cap screws and locknuts from the clamp hub, 1, at the rear of the clutch.
- Loosen the six cap screws, 2, around the clutch housing, one half turn at a time until all six cap screws are loose. Carefully remove the six cap screws and nuts from the clutch, and discard them.

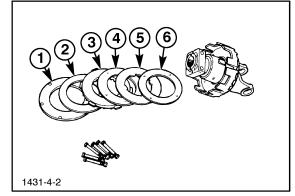
Remove the internal components one at a time over the clamp hub at the rear of the clutch.

The clutch contains a compression plate, 1, disc spring, 2, ribbed pressure plate, 3, friction disc, 4, separator plate, 5, and friction disc, 6.

Discard the friction discs, 4 and 6.



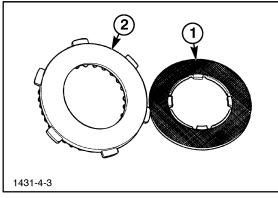
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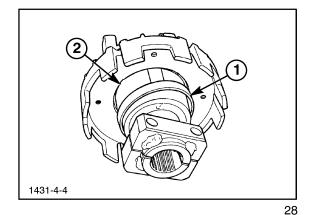
Slip Clutch - Inspection

- Inspect the separator plate, 1, for discoloration, warpage or cracking; replace if any damage is found. Both faces of the separator plate should have a rough surface; replace the plate if either face is worn smooth. Inspect the inner drive tangs for excessive wear; replace the plate if drive tangs are rounded off or worn more than 1/3 through.
- Inspect the ribbed pressure plate, 2, for discoloration or cracking; replace if any damage is found. Lay a straight edge across the face of the pressure plate; replace if warped more than 1.6 mm (1/16").
- Inspect the disc spring, 2, Figure 26, for discoloration or cracking; replace if any damage is found. Use a depth micrometer or calipers to measure the height of the disc spring when placed on a flat surface; it should be between 10.2-10.7 mm (0.400" - 0.420"). Replace spring if it is less than specified range.

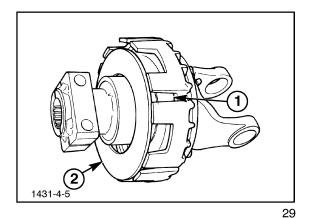


Slip Clutch - Reassembly

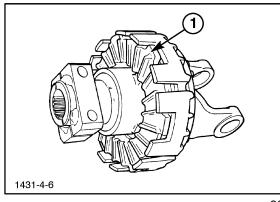
1. A spacer, 1, is used on the outer overrunning clutch hub, 2, to prevent the hub from shifting rearward during use. Ensure this spacer is installed over the outer overrunning clutch hub before rebuilding the slip clutch.



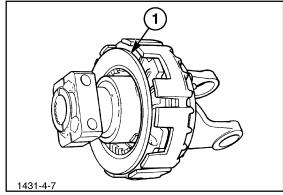
2. Install a new friction disc into the clutch housing, followed by the separator plate, 1, and another friction disc, 2.



3. Install the pressure plate, 1, in the housing with the flat surface facing the friction disc; align the tabs on the pressure plate with the relief notches in the housing.

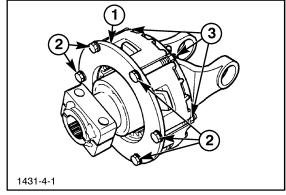


 Position the disc spring, 1, over the clutch hub so that the inside diameter of the disc spring contacts the ribs on the pressure plate.



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- 5. Position the compression plate, 1, over the clutch hub against the outer diameter of the disc spring, and install six new cap screws, 2, through the compression plate and the grooves in the housing. Insert new nuts, 3, into the pockets on the front of the clutch housing and thread the bolts into the nuts until snug to hold the assembly together.
- 6. Tighten all six cap screws, 2, evenly until snug, and then one additional one half turn each, to hold the clutch components securely, and to provide the setting for running in the clutch.

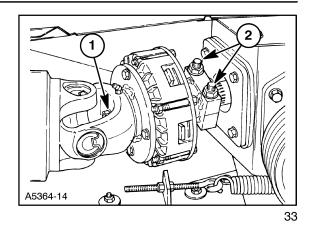


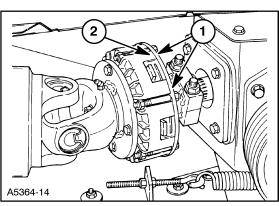
- 7. The slip clutch must be installed on the unit and run in before use.
- 8. Install the drive shaft and slip clutch assembly so that the two crimped splines align with the slot in the front of the secondary drive shaft. Slide the two drive shaft halves together.
- 9. Slide the slip clutch onto the input shaft as far as possible. Thread the bolt, 1, inside the slip clutch hub into the end of the shaft, and tighten as much as possible to pull the slip clutch hub securely onto the tapered end of the gearbox shaft. Tighten the two 1/2" x 3" Grade 8 cap screws, 2, and locknuts at the rear of the clutch to 87 N·m (64 ft. lbs.).

NOTE: Do not overtorque; locknuts are Class C, and are limited to 87 N m (64 ft. lbs.).

- 10. Attach a tractor to the disc mower-conditioner as outlined in the "General Information" section of this manual, if not already connected.
- 11. Operate the tractor at 1/3 throttle, and engage the tractor PTO for several seconds, or until the slip clutch visibly smokes, at which time, disengage the tractor PTO. Turn the tractor off. If the clutch does not slip, disassemble the clutch and check for proper assembly.
- 12. After slipping the clutch, tighten the six cap screws 1/2 turn at a time until the compression plate, 1, contacts the clutch housing, 2.

NOTE: The slip clutch is set at 1356 N m (1000 ft. lbs.) (static) of breakaway torque. Do not attempt to alter the slip clutch setting or damage to the machine could result.





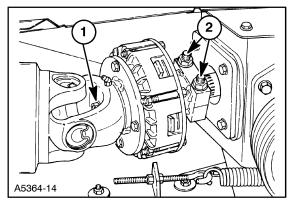
Slip Clutch - Installation

 Install the drive shaft and slip clutch assembly so that the two crimped splines align with the slot in the front of the secondary drive shaft. Slide the two drive shaft halves together.

IMPORTANT: The PTO shafts are very heavy and awkward; use caution not to drop the shaft assemblies as personal injury or damage to the components may result.

2. Slide the slip clutch onto the input shaft as far as possible. Thread the bolt, 1, inside the slip clutch hub into the end of the shaft, and tighten as much as possible to pull the slip clutch hub securely onto the tapered end of the gearbox shaft. Tighten the two 1/2" x 3" Grade 8 cap screws, 2, and locknuts to 87 N·m (64 ft. lbs.).

NOTE: Do not overtorque; locknuts are Class C, and are limited to 87 N m (64 ft. lbs.).



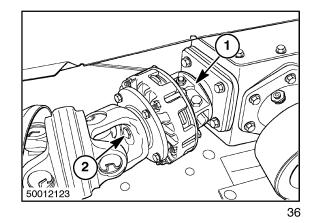
SLIP CLUTCH MODEL 1411, SERIAL NUMBER 644148 AND ABOVE MODEL 1412, SERIAL NUMBER 646501 AND ABOVE

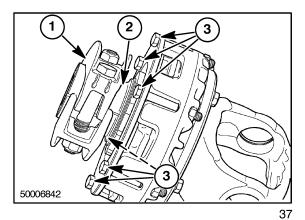
Slip Clutch - Removal

- Loosen and remove clamp, 1, from the hub of the overrunning clutch.
- 2. Turn out the center bolt, 2, and slide the clutch from the gearbox input shaft.
- 3. Slide the two drive shaft halves apart.

Slip Clutch - Disassembly

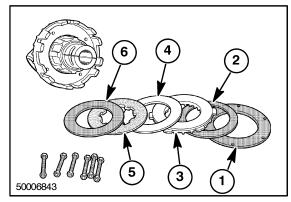
 Remove the clamp, 1, from the hub of the overrunning clutch, 2 (if applicable). Loosen the six cap screws, 3, around the clutch housing, one half turn at a time until all six cap screws are loose. Carefully remove the six cap screws and nuts from the clutch, and discard them.





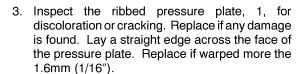
2. Remove the internal components one at a time from the clutch housing.

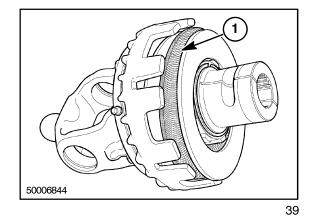
The clutch contains a compression plate, 1, disc spring, 2, ribbed pressure plate, 3, friction disc, 4, separator plate, 5, and friction disc, 6. Discard friction discs, 4 and 6.

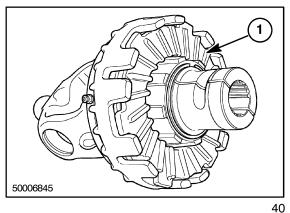


Slip Clutch - Inspection

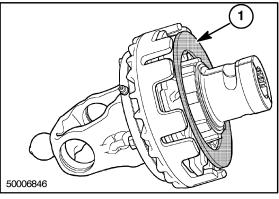
- Inspect the separator plate, 1, for discoloration, warpage or cracking, replace if any damage is found. Both faces of the plate should have a rough surface. Replace the plate if either face is worn smooth.
- 2. Inspection the inner drive tangs for excessive wear. Replace the plate if drive tangs are rounded off or worn more than 1/3 through.





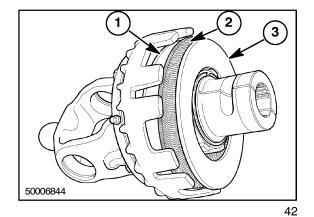


4. Inspect the disc spring, 1, for discoloration or cracking. Replace if any damage is found. Use a depth micrometer or calipers to measure the height of the disc spring when placed on a flat surface. It should be between 10.2 - 10.7mm (0.400 - 0.420"). Replace the spring if it is less than the specified range.

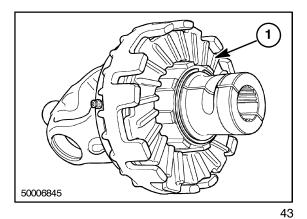


Slip Clutch - Assembly

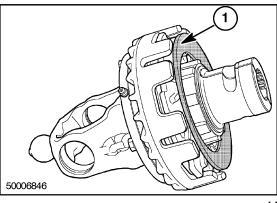
1. Set a new friction disc, 1, into the clutch housing, followed by the separator plate, 2, and another friction disc, 3.



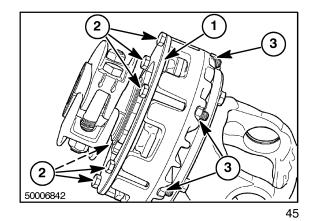
2. Slide the pressure plate, 1, into the housing with the flat surface facing the friction disc. Align the tabs on the plate with the relief notches in the housing.



3. Position the disc spring, 1, over the clutch hub so that the inside diameter of the disc spring contacts the ribs on the pressure plate.



- 4. Set the compression plate, 1 over the hub against the outer diameter of the disc spring, and install six new cap screws, 2, through the compression plate. Insert new nuts, 3, into the pockets on the front of the clutch housing and thread the bolts into the nuts until snug to hold the assembly together.
- Tighten all six cap screws evenly until snug, and then one additional one half turn each to hold the clutch components securely, and to provide the setting for running in the clutch.

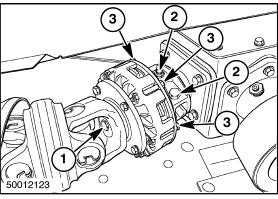


Slip Clutch - Installation

The slip clutch must be installed on the unit and run in before use.

- Install the drive shaft and slip clutch assembly so that the two crimped splines align with the slot in the front of the secondary drive shaft. Slide the two drive shaft halves together.
- 2. Slide the slip clutch onto the input shaft as far as possible. Thread the bolt, 1, inside the slip clutch hub into the end of the shaft, and tighten as much as possible to pull the slip clutch hub securely onto the tapered end of the gearbox shaft. Tighten the two 1/2 x 3" Grade 8 cap screws, 2, and lock nuts at the rear of the clutch to 87 Nm (64 ft lbs).

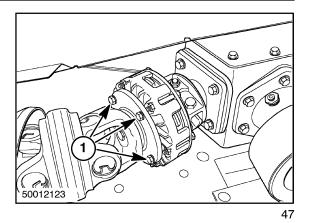
NOTE: Do not over tighten. The lock nuts are Class C, and are limited to 87 Nm (64 ft lbs).

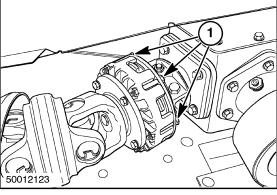


Slip Clutch - Run In

- 1. If applicable: Loosen the six cap screws, 1, (three shown), 1/2 turn at a time until all are just loose. Tighten the cap screws 1/2 turn.
- 2. Attach a tractor to the disc mower-conditioner as outlined in the "General Information" section of this manual, if not already connected.
- Operate the tractor at 1/3 throttle, and engage the tractor PTO for several seconds, or until the slip clutch visibly smokes. Disengage the tractor PTO. Turn the tractor off. If the clutch does not slip, disassemble the clutch and check for proper assembly.
- 4. After slipping the clutch, tighten the six cap screws, 1, (three shown), 1/2 turn at a time until the compression plate contacts the clutch housing.

IMPORTANT: The slip clutch is set at 1356 Nm (1000 ft lbs) (static) of breakaway torque. Do not attempt to alter the setting or damage to the machine could result.





REPAIR TIME SCHEDULE

Procedure	Time
Burnishing Clutch	0.33
Slip clutch, R & R	0.50
Slip Clutch, Rbld	1.25

SECTION 31 - POWER TAKE-OFF SYSTEMS

Chapter 3 - Overrunning Clutch

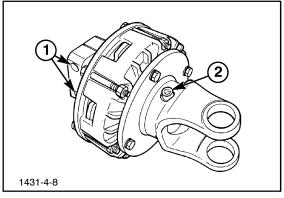
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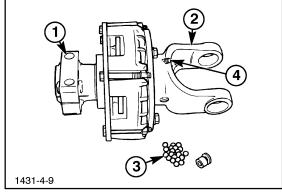
OVERRUNNING CLUTCH MODEL 1411, INCLUDING AND BETWEEN SERIAL NUMBER 614786 TO 644147 MODEL 1412, SERIAL NUMBER 646500 AND BELOW

Overrunning Clutch - Disassembly

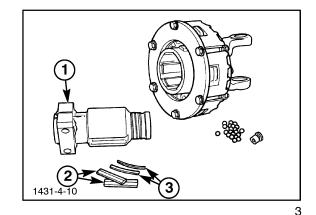
- If the overrunning clutch does not operate when the tractor PTO is disengaged, the overrunning clutch must be disassembled for inspection. Remove the slip clutch from the unit as previously described. It is possible to repair the overrunning clutch without disassembling the slip clutch.
- 2. Remove the two cap screws and locknuts from the clamp hub, 1, at the rear of the clutch.
- To disassemble the overrunning clutch hub, the bearing between the inner overrunning clutch hub and the yoke assembly must be disassembled. Remove the hex socket head cap screw, 2, from the yoke assembly, and spray penetrating fluid into the hole to remove the grease.
- 4. Rotate the hub, 1, in the yoke, 2, while holding the hole down until all the balls, 3, fall out; there are 20 balls in the overrunning clutch bearing. It may be necessary to remove the grease zerk, 4, on the yoke and spray penetrating fluid in the grease passage to assist in removing the balls.



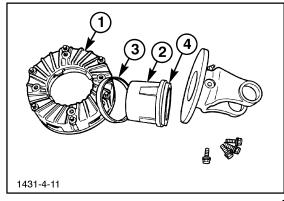
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5. Slide the inner overrunning hub, 1, out of the yoke. Remove and clean the two overrunning clutch pawls, 2, and leaf springs, 3, from the inner hub.



6. Remove the four cap screws retaining the slip clutch assembly, 1, to the yoke, and remove it. Slide the outer overrunning clutch hub, 2, and spacer, 3, out the front of the slip clutch assembly. Remove the grease seal, 4, from the front of the overrunning clutch hub and discard it.

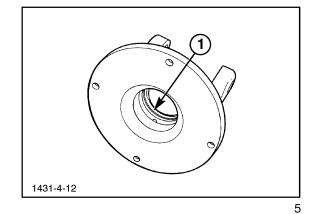


Overrunning Clutch - Inspection

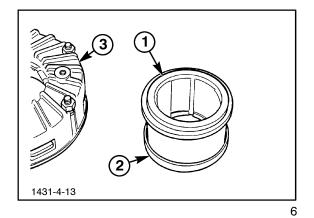
- 1. Inspect the overrunning pawls and ramps on the inner diameter of the outer overrunning clutch hub for wear or damage; replace the components as required.
- 2. Inspect the overrunning hub and yoke bearing grooves and mating surfaces for galling or other damage; replace as necessary. Discard the overrunning bearing balls and replace with new parts.

Overrunning Clutch - Assembly

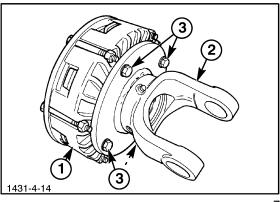
1. Remove and discard the O ring seal, 1, in the yoke plate. Install a new O ring into the groove in the yoke plate.



2. Install a new grease seal, 1, on the end of the outer overrunning clutch hub. Slide the spacer, 2, over the outside of the clutch hub, and position the assembly into the slip clutch assembly, 3.



3. Position the slip clutch assembly, 1, against the yoke plate, 2, and loosely install the four cap screws, 3, to retain the clutch assembly.

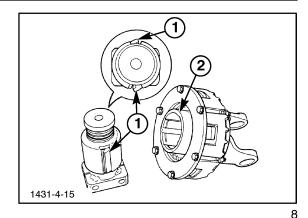


4. Install the leaf springs and pawls, 1, into the inner overrunning clutch hub, oriented as shown.

The leaf spring should be installed with the ends down on the hub, and the curve facing up. Install the pawls so that the step is down on the spring, and is facing the direction of rotation (clockwise as viewed from the bearing end of the inner hub). Apply a thin film of grease to the overrunning clutch hub and pawls.

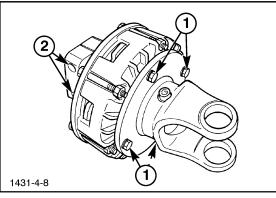
Slide the inner overrunning clutch hub assembly through the outer clutch hub, 2, and into the yoke so that the hole in the yoke aligns with the bearing groove in the hub.

5. Drop the new ball bearings, 1, in through the hole into the bearing groove; there are 20 balls used. Install the hex socket head cap screw, and tighten it securely. Reinstall the grease zerk, 2, in the yoke, and pump grease into the bearing while rotating the overrunning hub to distribute grease in the bearing. Wipe away any excess grease.



1431-4-16

6. After rotating the overrunning clutch several revolutions to center all components, securely tighten the four cap screws, 1, retaining the slip clutch assembly to the yoke plate. Install the two cap screws and locknuts through the clamp hub, 2, on the rear of the slip clutch.

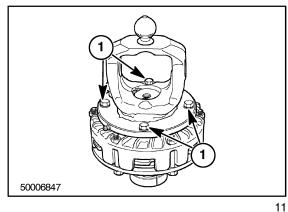


OVERRUNNING CLUTCH MODEL 1411, SERIAL NUMBER 644148 AND ABOVE MODEL 1412, SERIAL NUMBER 646501 AND ABOVE

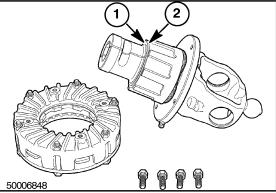
Overrunning Clutch - Disassembly

If the overrunning clutch does not operate when the tractor PTO is disengaged, the overrunning clutch must be disassembled for inspection. Remove the slip clutch from the unit as previously described. It is possible to repair the overrunning clutch without disassembling the slip clutch.

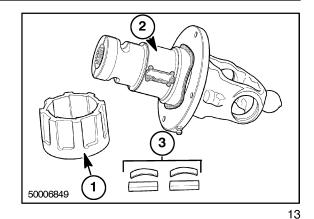
1. Turn out the four cap screws, 1, holding the overrunning clutch to the slip clutch housing.



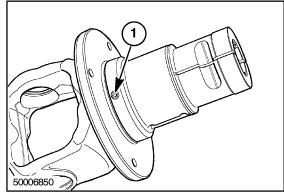
2. Pry out the snap ring, 1, and lift off the washer, 2, from the hub of the overrunning clutch.



3. Slide the hub, 1, from the yoke shaft, 2. Capture the pawls and leaf springs, 3, as the hub is slid from the shaft.



4. Turn the set screw, 1, from the ball bearing cavity. Rotate the yoke shaft with the hole down until all the bearings fall out. There are thirty balls in the overrunning clutch bearing cavity. It may be necessary to apply a small amount of penetrating fluid to assist in removing the ball bearings.



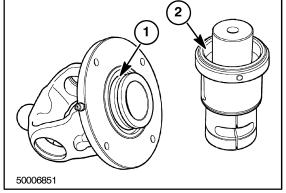
Overrunning Clutch - Inspection

- Inspect the overrunning pawls and ramps on the inner diameter of the outer overrunning clutch hub for wear or damage, replace the components as required.
- Inspect the overrunning hub and yoke bearing grooves and mating surfaces for galling or other damage, replace as necessary. Discard the overrunning ball bearings and replace with new parts.

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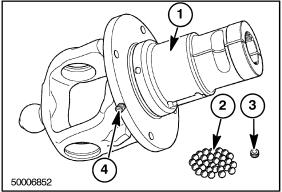
Overrunning Clutch - Assembly

1. Apply a film of grease to the inner, 1, and outer, 2, race of the ball bearing cavity.



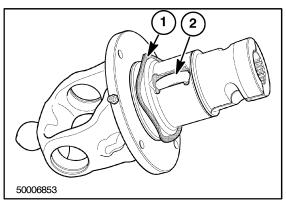
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2. Set the outer yoke shaft, 1, onto the inner shaft. Insert the ball bearings, 2, into the cavity until all thirty are in place. Turn in the set screw, 3, and tighten it securely. Apply grease through the zerk, 4, while rotating the overrunning hub to distribute the lubricant evenly. Wipe away any excess grease.

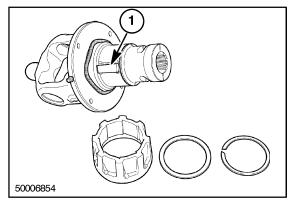


16

3. Slide the spring washer, 1, in place over the yoke shaft. Apply grease to the spring recesses in the shaft, and set the leaf springs, 2, into place with the concave side facing toward the center.

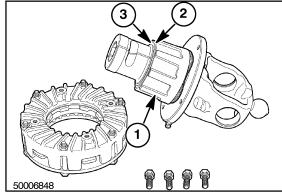


4. Apply a film of grease to the pawls, 1, and set each in place on top of the leaf springs.

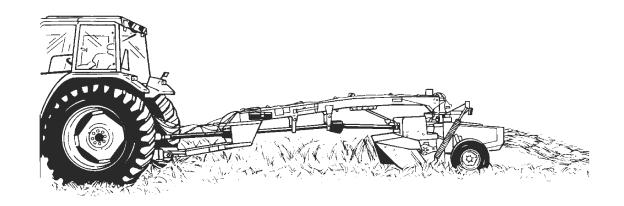


18

- 5. Slide the hub, 1, over the pawls. Secure the hub in place with the washer, 2, and snap ring, 3.
- 6. Install the slip clutch as previously described.



Disc and Sickle Mower Conditioners Technical Training



Wobble Drives and Gearboxes



INSTALLATIONINSTRUCTIONS

WOBBLE ASSEMBLY AND REPAIR WITH THE WOBBLE TOOL KIT

SICKLE HEADERS

NEW HOLLAND MODELS HS SERIES 14HS-SPL

CASE IH MODELS HDX2 SERIES HSX142

THE FOLLOWING INSTRUCTIONS SUPERCEDE THE HS SERIES AND HDX2 SERIES INSTRUCTIONS IN THE REPAIR MANUALS PRIOR TO 12/03

APPROXIMATE INSTALLATION TIME - 1.5 HOURS

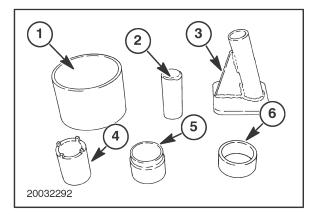
PLEASE READ THE COMPLETE INSTRUCTION SHEET BEFORE STARTING DISASSEMBLY AND ASSEMBLY WITH THIS TOOL KIT.

NOTE: The left and right sides of the machine are referenced while standing behind the unit, facing the normal direction of travel.

The Wobble Tool Kit is designed specifically for the short wobble shaft assemblies. The tools make disassembly and assembly of the wobble assembly faster and easier.

KIT CONTENTS

Ref.	Description	Qty.
1	Wobble Flat Stand	1
2	Bearing Installer	1
3	Wobble Angle Stand	1
4	Staked Nut Tool	1
5	Bearing Cup Installer	1
6	Seal Installer	1



WOBBLE DRIVE ASSEMBLY REPAIR

Check for wear in the wobble drive by placing the sickle at the center of its stroke. Slightly rotate the flywheel each direction until the sickle begins to move. If there is any movement of flywheel before the sickle moves, there is excessive wear in the wobble hub bearings, trunnion bearings, steady rest bearings, or knife bushings. Repair or adjust as necessary.

NOTE: Repairing the Yoke, Steady Bearing, or Wobble Cross Shaft separately are covered later in this section.

WOBBLE DRIVE ASSEMBLY REMOVAL

1. Raise the header fully and engage the header lift locks.



MARNING



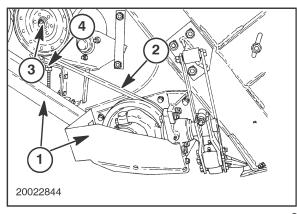
Work must be performed under the header. Failure to engage the header lift locks could cause severe personal injury.

NOTE: Refer to the operator's manual, of the base unit, for the proper procedure for locking the lift mechanism.

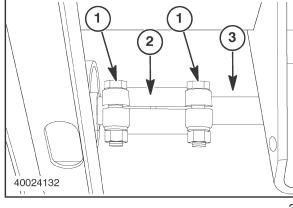
- 2. Open the header side door and latch it in the open position.
- 3. When repairing the right wobble, remove both shields, 1. Thoroughly clean the wobble drive before starting disassembly.

NOTE: If removing the right wobble assembly, loosen the sickle drive belt, 2, by loosening idler bolt, 3, and backing off the drawbolt, 4. The belt can be removed from the drive pulley first and then from the wobble assembly.

4. Remove clamping bolts, 1, from the shaft coupler, 2. Drive a chisel into the coupler to spread it slightly, and slide it over the cross shaft, 3, toward the middle of the machine.



2



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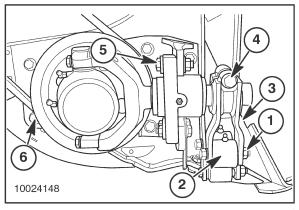
- 5. Remove the bolt, 1, in the outer end of the connecting rod. Swing connecting rod, 2, down out of link, 3. Do not lose the oil seal spacers on the front and back of the connecting rod. Be sure no dirt gets into the bearings.
- 6. Loosen clamping bolt, 4, and remove link, 3, and the kev.
- 7. Remove the steady rest bolts, 5, and pull the end of the yoke shaft out and away from the header. Slide the steady rest bearing off the yoke shaft.



The wobble assembly is very heavy and the yoke can pinch your fingers very easily. Be careful where you place your fingers.

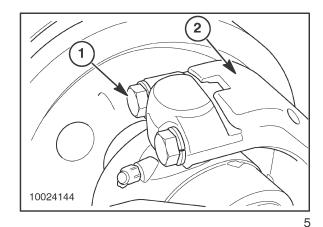
8. The wobble assembly can now be removed. Remove the five mounting plate bolts, 6, and hardwashers.

NOTE: Older units will have six bolts.

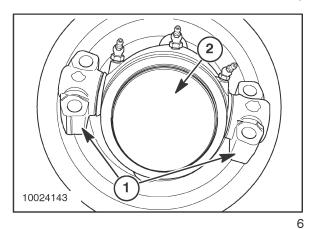


WOBBLE DRIVE DISASSEMBLY

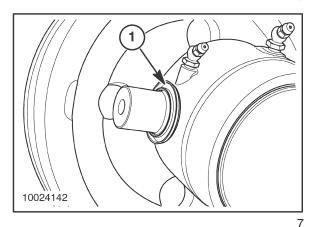
- 1. Slide the steady rest bearing off the yoke.
- 2. Remove the yoke capscrews, 1, and remove the yoke, 2.



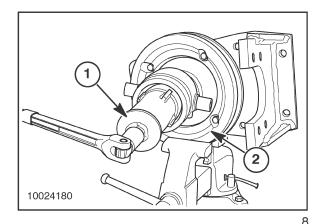
- 3. Remove the trunnions, 1, from the wobble hub.
- 4. Pry the hub grease cap, 2, off the wobble hub.



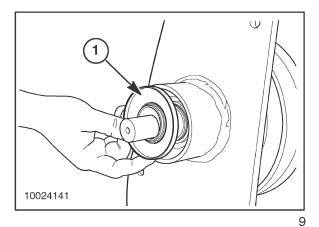
5. Remove the deflectors, 1, from the wobble hub.



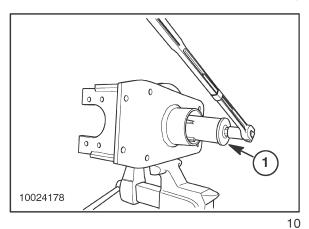
6. Remove the hub side shaft lock nut with the Nut Tightener Special Tool, 1. Clamp the belt sheave, 2, in a vise.



7. Remove the grease seal, 1, from the outside of the mounting plate housing.

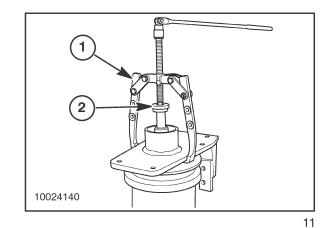


8. Remove the mounting plate side shaft lock nut with the Nut Tightener Special Tool, 1. Clamp the belt sheave in a vise.

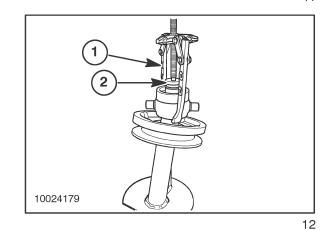


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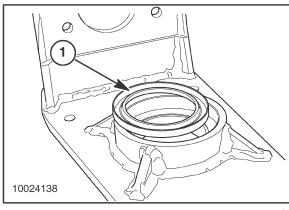
- Separate the mounting plate and outer bearing from the wobble shaft and flywheel with a suitable gear puller. 1. Protect the shaft with a disc, 2. Use the Wobble Flat Stand, to steady the assembly.
- 10. Remove the inner bearing with a suitable gear puller.



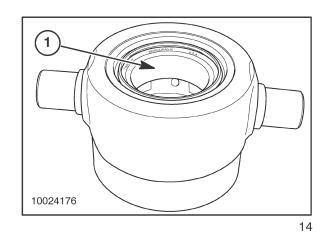
- 11. Separate the hub and outer bearing from the wobble shaft and flywheel with a suitable gear puller, 1. Protect the shaft with a disc, 2. Use the Wobble Angle Stand special tool, to hold the hub vertical.
- 12. Remove the inner bearing with a suitable gear puller.



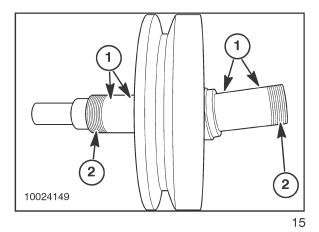
13. Remove the seal, 1, from the inside of the mounting plate housing.



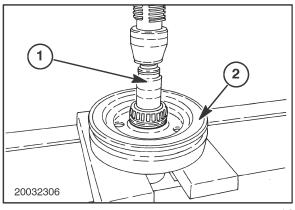
14. Use cap installer to remove bearing cups, 1.



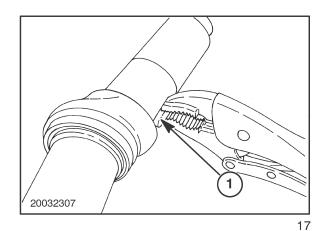
- 15. Inspect all the bearing races, 1, for wear.
- 16. Inspect the threads, 2, for any damage.



17. Press the Wobble shaft, 1, out of the Flywheel, 2. **NOTE:** Flywheel and Wobble shaft may be purchased separately.

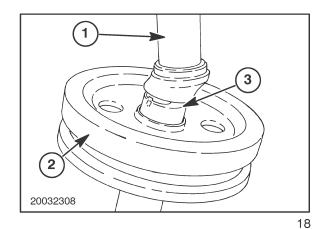


18. Remove Key, 1, from Wobble Shaft.

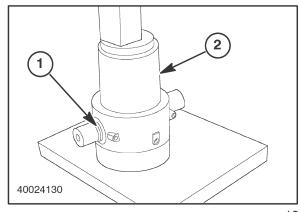


WOBBLE DRIVE ASSEMBLY

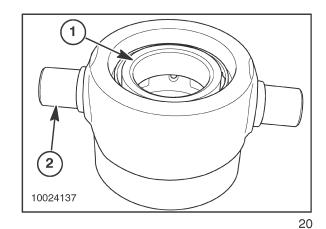
- 1. Install key in new Wobble shaft. Use the Wobble Angle Stand to press the Wobble shaft, 1,into the Flywheel, 2, until the shoulder of the Wobble shaft, 3, contacts the Flywheel.
- 2. Verify that the key and keyway are aligned during the assembly process.



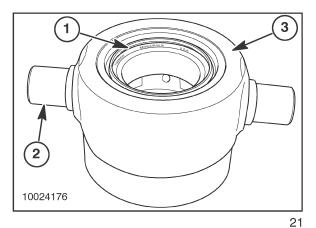
- 3. Press a bearing cup into both ends of the wobble hub, 1. Use the Bearing Cup Installer, 2, to press the cup evenly.
- 4. Press until the cup bottoms out on the inside shoulder.



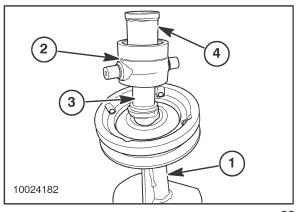
5. Pack the bearings with grease, and place one tapered roller bearing, 1, into the end of the hub toward the trunnions, 2.



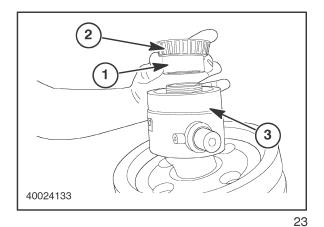
6. Install grease seal, 1, into the hub on the side with the trunnions, 2. The seal should be installed with the lip, 3, facing out.



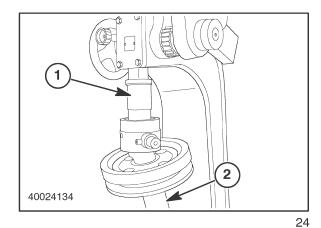
- 7. Place the shaft and sheave assembly into the Wobble Angle Stand special tool, 1, to hold the hub side shaft as exactly vertical as possible.
- 8. Place the hub, 2, on the wobble shaft, 3, with the seal and trunnions down. Use the Bearing Installer, 4, and press down until the bearing bottoms out on the shaft base.



9. Install the spacer, 1, and the outside bearing, 2, packed with grease into the hub, 3.

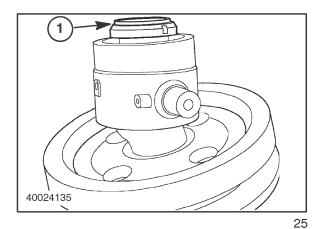


10. Use the Bearing Installer, 1, and press down until the bearing bottoms out on the shaft base. Use Wobble Angle Stand special tool, 2, to hold the hub side shaft as exactly vertical as possible.



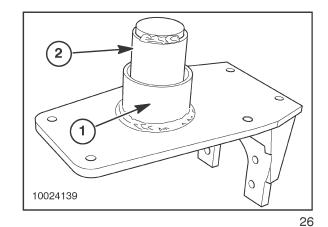
11. Install the special lock nut, 1, and thread down until snug.

NOTE: Flat surface of nut must be against the bearing.

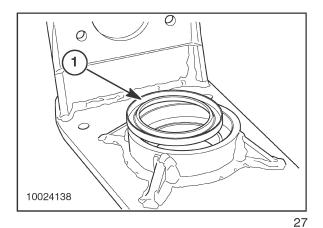


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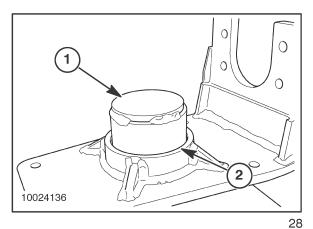
- 12. Press a bearing cup into both ends of the wobble mounting plate, 1. Use the Bearing Cup Installer, 2, to press the cup in evenly.
- 13. Press in until the cup bottoms out on the inside shoulder.



14. Install the inside seal, 1, into the mounting plate with the flat side down. Use installer as described below.

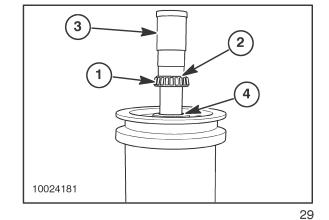


- 15. Use the Seal Installer, 1, to install the inside seal evenly, without bending.
- 16. Press the seal in until it is flush with the flat surface of the hub end, 2.

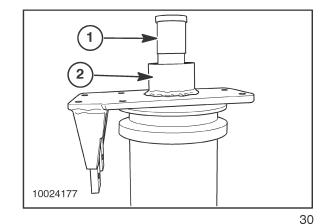


17. Install a bearing, packed with grease, 1, and spacer, 2, on the straight shaft side of the shaft and flywheel assembly. Use Bearing Installer, 3, to press in bearing until the bearing bottoms out on the flywheel center, 4.Use Wobble Flat Stand to keep the shaft vertical.

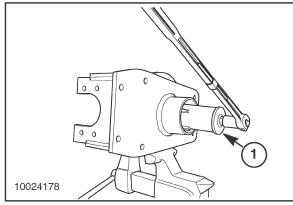
IMPORTANT: DO NOT FORCE BEARING to the point that the shoulder of the wobble shaft is pushed away from the flywheel.



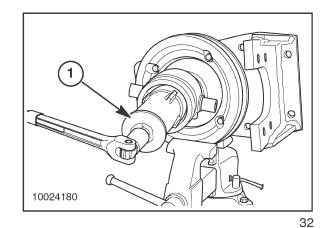
- 18. Place the mounting plate, 1, on the straight wobble drive shaft. Use the Wobble Flat Stand to keep the shaft vertical.
- 19. Place a bearing packed with grease inside the mounting plate housing, and use the Bearing Installer, 2, to press down until the bearing bottoms out on the spacer.
- 20. Install the special locknut and thread down until snug.



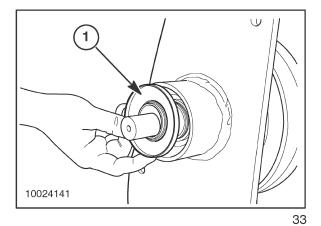
21. Clamp the belt sheave in a vise, and tighten the mounting plate side special lock nut with the Nut Tightener Special Tool, 1. Tighten the nut on the bearings to 200 N·m (150 ft-lb).



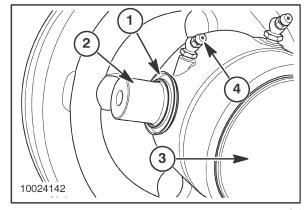
22. Clamp the belt sheave in a vise, and tighten the hub side special lock nut with the Nut Tightener Special Tool, 1. Tighten the nut on the bearings to 200 N·m (150 ft-lb).



23. Install the outside seal flat side down. Tap down with a flat surface gently until the outside edge is flush with the outside housing.



- 24. Install the deflectors, 1, on the trunnions, 2, with the concave side out.
- 25. Place the grease cap, 3, on the hub and tap until it snaps into place.
- 26. Install the three grease zerks, 4, on the hub.



WOBBLE DRIVE ASSEMBLY INSTALLATION



WARNING



Work must be performed under the header. Failure to engage the head lift locks could result in severe personal injury. Raise the header and install the header lift locks.

NOTE: Refer to the operator's manual of the base unit for the proper procedure for locking the lift mechanism.

Do not tighten hardware until instructed to do so.

NOTE: the following procedure is required for shimming of the wobble mounting plate. Check the product identification number (PIN) and model number of the unit before selecting the correct shim combination.

Turn wobble hub so the grease zerks, 1, are to the rear of the machine.

Install the wobble mounting plate on the frame with five bolts, 2, lock washers and hardwashers.

NOTE: Older units will have six bolts.

SHIMMING THE WOBBLE MOUNTING PLATE

Long Shims (HS16 only)

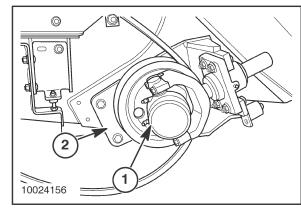
For the first production run of the **16HS** Header, long shims, 1, were added between the wobble drive assembly and the header frame on the left wobble assembly ONLY.

The long shims were added on the left side to adjust the end of the left knife to obtain a minimum of 2 mm (0.079 in) clearance with the nearest right-side guard in the center of the cutterbar.

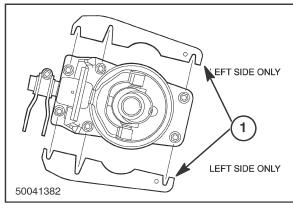
The long shims were used in production for the **16HS** from the following serial numbers:

16HS-S/N 1110000 TO S/N 1110181

After the requirement for the long shims was eliminated, some wobble drive assemblies of the **16HS** did not have any shims.



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The following serial numbers are of **16HS** headers **WITHOUT** shims:

16HS- S/N 1110168 to S/N 1110265

The wobble drive assemblies for the first production run of the **HDX-2 Series** did not have any shims. The following PIN 's for these units were:

HDX122 - HCA0027000 to HCA0027005 HDX142 - HCA0028000 to HCA0038116 HDX162 - HCA0029000 to HCA0029109 HDX182 - HCA0030000 to HCA0030030

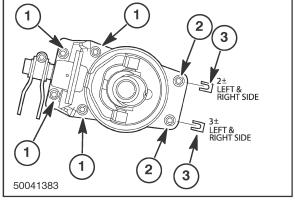
THE FIRST SHIMMING PROCEDURE

The wobble drives that were shimmed with the horseshoe shims at the **REAR** of the wobble drive assemblies were in the following PIN ranges:

HDX142 - HCA0028117 to HCA0028119 HDX162 - HCA0029110 to HCA0029174 HDX182 - HCA0030031 to HCA0030035

12HS - 1090000 to 1090037 14HS - 1100000 to 1100375 16HS - 1110265 to 1110823 18HS - 1120000 to 1120258

- 1. Tighten the front four mounting bolts, 1.
- 2. Measure the gap between the header frame and the wobble drive assembly at the two rear mounting bolts. 2.
- 3. Install the horseshoe shims, 3, to obtain a maximum gap of 0.4 mm (0.016 in) at each bolt.
- 4. Tighten all the wobble drive assembly mounting bolts to a torque of 159 N·m (117 ft-lb).



CURRENT PRODUCTION SHIMMING PROCEDURE

The bottom rear hole has been eliminated on the wobble drive mounting plate, 1. Therefore, a new shimming procedure is being used in production.

Check the wobble assembly mounting area with a straight edge to verify which side of the wobble drive assembly will require shimming.

If the gap between the straight edge and the frame is at the rear bolt hole, then the prior shimming method can be used.

If the gap is at the front two bolt holes, then the following shimming procedure should be used.

SHIMMING PROCEDURE FOR THE FRONT TWO BOLT HOLES

- 1. Tighten the rear three mounting bolts, 2.
- 2. Measure the gap between the header frame and the wobble drive assembly at the front two mounting bolts, 1.
- 3. Install the horseshoe shims, 3, to obtain a maximum gap of 0.4 mm (0.016 in) at each bolt.
- 4. Tighten all the wobble drive assembly mounting bolts to a torque of 159 N·m (117 ft-lb).

The new shimming procedure was started at the following PIN's:

HDX122 - HCA0027006

HDX142 - HCA0028120

HDX162 - HCA0029174

HDX182 - HCA0030035

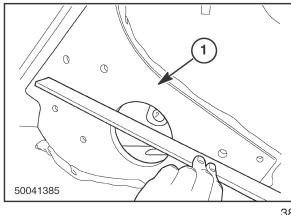
12HS - 1090038

14HS - 1100376

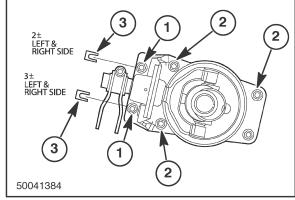
16HS - 1110824

18HS - 1120259

NOTE: The majority of the wobble drive assemblies shimmed after this PIN range has been shimmed at the top front bolt of the wobble drive assembly.



SC

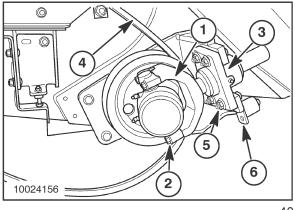


1. Install the yoke shaft, 1, on the trunnion bearings with the keyway pointing down, and install the four1/2"-13 x 2-1/2" cap screws, 2, and split lock washers, but do not tighten.

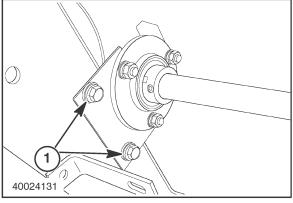
NOTE: Be sure the keyway in the yoke shaft is pointing down so the drop link can be attached.

- 2. Make certain the trunnion bearings are properly seated under the lip on the yoke. Tighten all four bolts snugly, and then tighten to 115 N⋅m (85 ft-lb).
- 3. Before reinstalling the steady rest bearing housing, remove any paint from mating surfaces of the two housings.
- 4. Slide the steady rest bearing housing, 3, over the shaft, using caution to prevent damage to the shaft seals, and align it with the mount.
- 5. On right side wobble drives, loop the sickle drive belt, 4, over the wobble sheave.
- 6. Swing the steady rest housing into place and secure with four 1/2" x 2-1/2" capscrews, 5, hardened washers, lock washers and flanged nuts. The "L" plate, 6, takes the place of two washers on the lower capscrews. Tighten the steady rest bolts to 165 N·m (123 ft-lb).

NOTE: Before installing coupler, loosen bearing mounting bolts, 1, to align coupler with the wobble shaft.



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- 7. Align the key in the end of the wobble shaft, 1, with the slot in the coupler, 2.
- 8. Slide the coupler over the wobble shaft and tighten the coupler clamping bolts, 3, completely.

NOTE: A wedge may be needed to spread the coupler to allow it to slide on the wobble shaft.

- 40024132
- Slide drop link, 1, onto the yoke shaft. Swing connecting rod, 2, up into it, making sure the oil seal spacers stay in place on the connecting rod. Install bolt, 3, nut, and smaller diameter hardened washers in connecting rod. Tighten to 159 N·m (117 ft-lb).
- 10. Install and tighten the drop link clamp bolt, 4, to 159 N·m (117 ft-lb).

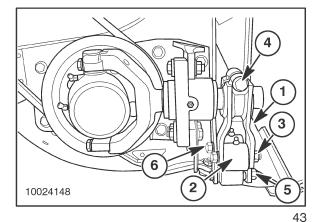
IMPORTANT: The swing arm pivot, connecting rod, drop link and knife head use Grade 8 hardware to secure them. Do not use Grade 5 hardware in these locations or wobble drive failure will occur. Also, install these bolts with the bolt head toward the wobble hub.

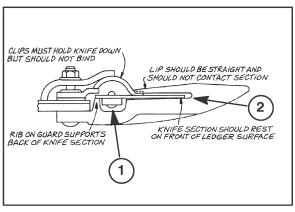
11. Rotate the wobble drive and shift the knife, as necessary, to position the knife in the center of its stroke. Torque knife head bolt, 5, and swing arm pivot bolt, 6, to 159 N·m (117 ft-lb).

NOTE: Be sure the knife is in the center of the stroke when the knife head and swing arm pivot bolts are tightened.

NOTE: Check to be sure the belt groove in the flywheel aligns with the drive pulley (right side only).

12. The knife back, 1, must be centered from front to back in the guard opening. The outer knife section must contact the ledger surface of the guard, 2.





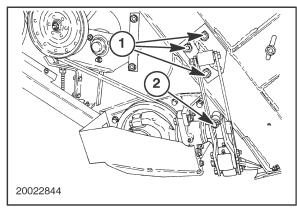
- 13. Loosen the bolts, 1, of the rocker arm mount and clamp bolt, 2, of the drop link.
- 14. Move the rocker arm mount and drop link forward or back to center the knife back in the guard.
- 15. Move the rocker arm support down to adjust the knife to contact the ledger surface. If more adjustment is needed, lengthen the slots of the rocker arm mount.
- 16. Tighten bolts, 1, securely and Grade 8 link bolt, 2, to 115 N·m (85 ft-lb).
- 17. Adjust the other sickle drive the same way.
- 18. Rotate the flywheel by hand and check for binding of the wobble shaft. If the flywheel does not rotate freely, repeat the knife rocker arm adjustment.

NOTE: If the knife assembly creates a drag, it may be necessary to remove the knife drive bolt to check thoroughly. If the knife drive bolt is removed for this purpose, retighten it to 159 N .m (117 ft-lb) with the knife in the center of the stroke when reinstalling.

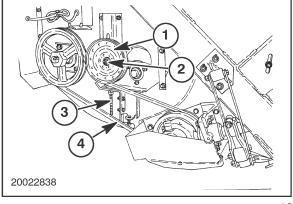
- 19. Adjust the sickle drive belt by moving idler, 1. Loosen bolt, 2, on the idler hub and move the idler with drawbolt, 3.
- 20. Adjust the belt so a force of 7 kg (15 lb) applied to the center of the belt, 4, opposite the idler deflects it 12 mm (1/2 in). When installing a new belt, adjust so it takes 8 kg (18 lb) to deflect 12 mm (1/2 in).

NOTE: Be sure to lock the jam nuts together on all drawbolts after adjustment is completed.

21. Reinstall all shields.

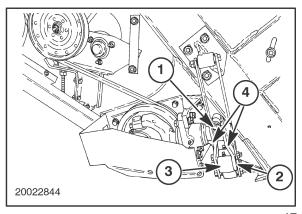


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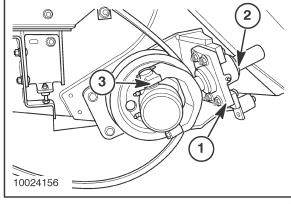


STEADY REST BEARING AND YOKE SHAFT REMOVAL

- 1. Loosen the drop link clamp bolt, 1.
- 2. Remove the bolt, 2, that attaches the connector assembly to the drop link.
- 3. Swing the connector assembly, 3, down out of the way. Do not lose the oil seal spacers on the front and rear of the connector assembly. Do not let any dirt into the bearings.
- 4. Remove the drop link, 4, from the shaft and remove any paint from the end of the shaft.
- 5. Remove the four steady rest housing bolts, 1. Swing the yoke shaft and steady rest housing, 2, away from the header. Pull the steady rest housing off the shaft.
- 6. Remove the trunnion bearing bolts, 3. Remove the yoke shaft from the wobble hub. Remove the trunnions bearings to prevent damage from falling off.

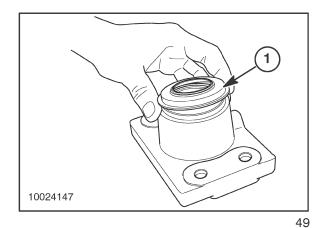


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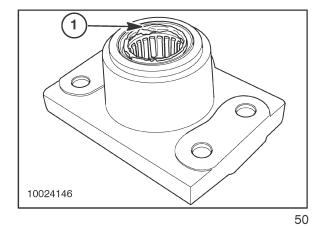


STEADY REST BEARING DISASSEMBLY

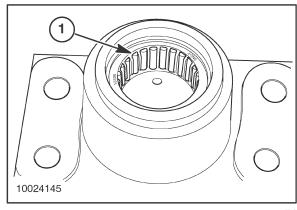
1. Remove the shields, 1, from both sides of the steady rest bearings.



2. Remove the seal, 1, from both sides of the steady rest housing.

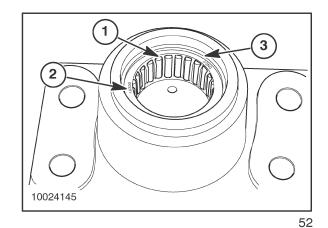


3. Use a punch to drive the bearings, 1, out of the steady rest housing.

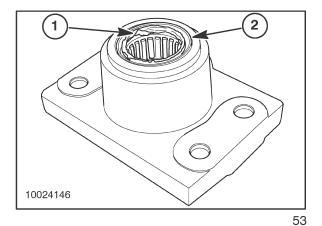


STEADY REST BEARING REASSEMBLY

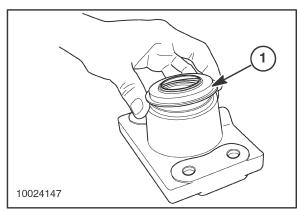
1. Install the a roller bearing, 1, into each end of the steady rest bearing housing with the print, 2, facing out. Press down until the bearing is even with the inside shoulder, 3.



2. Install a grease seal, 1, into each end with the flat side down. Press into the housing until the seal is flush with the outer edge, 2, of the housing.



3. Install a dust shield, 1, on each end of the steady rest housing. Tap the shield into place with a soft-face hammer until it snaps into place.



STEADY REST BEARING AND YOKE SHAFT INSTALLATION

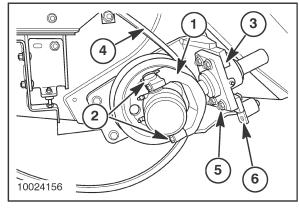
- Install the yoke shaft, 1, on the trunnion bearings with the keyway pointing down, and secure there with the four cap screws, 2, and split lock washers.
- 2. Make certain the trunnion bearings are properly seated under the lip on the yoke. Tighten all four bolts snugly, and then tighten to 115 N·m (85 ft-lb).

NOTE: Be sure the keyway in the yoke shaft is pointing down so the drop link can be attached.

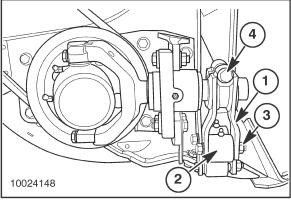
- 3. Before reinstalling the steady rest bearing housing, 3, remove any paint from the mating surfaces of the two housings.
- 4. On right side wobble drives, loop the sickle drive belt, 4, over the wobble sheave.
- 5. Slide the steady rest bearing housing over the yoke shaft, using caution to prevent damage to the shaft seals, and align it with the mount.
- 6. Swing the steady rest housing into place and secure with four 1/2" x 2-1/2" capscrews, 5, hardened washers, lock washers and flanged nuts. The "L" plate, 6, takes the place of two washers on the lower capscrews. Tighten the steady rest bolts to 165 N·m (123 ft-lb).
- 7. Slide drop link, 1, onto the yoke shaft. Swing connecting rod, 2, up into it, making sure the oil seal spacers stay in place on the connecting rod. Install bolt, 3, nut, and smaller diameter hardened washers in connecting rod. Tighten to 159 N·m (117 ft-lb).
- 8. Install and tighten the drop link clamp bolt, 4, to 159 N·m (117 ft-lb).

IMPORTANT: The swing arm pivot, connecting rod, drop link and knife head use Grade 8 hardware to secure them. Do not use Grade 5 hardware in these locations or wobble drive failure will occur. Also, install these bolts with the bolt head toward the wobble hub.

NOTE: Check to be sure the belt groove in the flywheel aligns with the drive pulley (right side only).



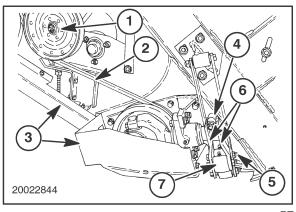
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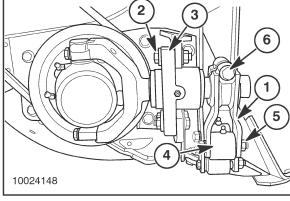
SICKLE DRIVE BELT REPLACEMENT

- 1. Loosen the belt tightener pulley, 1, and free the belt, 2, from the sheaves.
- 2. Remove the shields, 3, from the side of the frame.
- 3. Loosen the drop link clamp bolt, 4.
- 4. Remove the bolt, 5, that attaches the connector assembly to the drop link, 6.
- 5. Swing the connector assembly, 7, down out of the way. Do not lose the oil seal spacers on the front and rear of the connector assembly. Do not let any dirt into the bearings.
- 6. Remove the drop link, 1, from the shaft and remove any paint from the end of the shaft.
- 7. Remove the four steady rest housing bolts, 2. Swing the yoke shaft and steady rest housing, 3, away from the header.
- 8. Remove and replace the belt.
- 9. Swing the steady rest housing into place and secure with four bolts, 2, lock washers and nuts. Tighten the bolts to 165 N·m (123 ft-lb).
- 10. Slide drop link, 1, onto the yoke shaft. Swing connecting rod, 4, up into it, making sure the oil seal spacers stay in place on the connecting rod. Install bolt, 5, nut, and smaller diameter hardened washers in connecting rod. Tighten to 159 N·m (117 ft-lb).
- 11. Install and tighten the drop link clamp bolt, 6, to 159 N·m (117 ft-lb).

IMPORTANT: The connecting rod, drop link and knife head use Grade 8 hardware to secure them. Do not use Grade 5 hardware in these locations or wobble drive failure will occur. Also, install these bolts with the bolt head toward the wobble hub.



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NOTE: Check to be sure the belt groove in the flywheel aligns with the drive pulley.

- 12. Adjust the sickle drive belt by moving idler, 1. Loosen bolt, 2, on the idler hub and move the idler with drawbolt. 3.
- 13. Adjust the new belt so it takes 8 kg (18 lb) applied to the center of the belt, 4, opposite the idler deflects it 12 mm (1/2 in). After the belt is run-in, the belt adjustment is for a force of 7 kg (15 lb) to deflect it 12 mm (1/2 in).

NOTE: Be sure to lock the jam nuts together on all drawbolts after adjustment is completed.

14. Reinstall all shields.

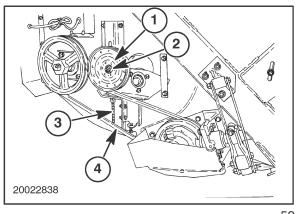
SICKLE DRIVE BELT TIMING -14HS-SPL / HSX14 SPECIALTY HEADERS ONLY

Both knives must reach the inner end of their stroke at the same time, or poor cutting and header vibration will result

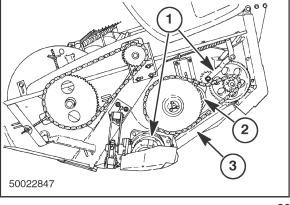
1. Check the sickle timed drive belt sprockets, 1, on both sides to be sure no crop debris has accumulated in them. If there is any discernible build up, clean them out thoroughly.

NOTE: When washing the header, be sure that no material or crop debris is left in the sickle drive sprockets as it will pack in and damage the belt.

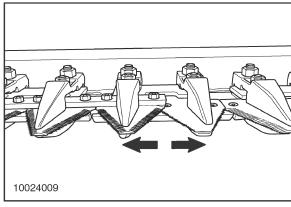
- 2. Assemble the left side of the header fully and tighten the belt by moving the idler pulley, 2. Sickle drive belt tension should be 8 kg (18 lb) to deflect a new belt 6 mm (1/2 in) in the middle of the lower span, 3. For a belt that has been run in, 7 kg (15 lb) would be sufficient force to deflect the belt 6 mm (1/2 in).
- Rotate both sickle wobble hubs, so both knife assemblies are either both fully inward or fully outward.



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- 4. Install the right side belt, 1, with no slack on the bottom side of the belt and tighten the belt with the idler. 2.
- 5. Adjust the idler so sickle drive belt tension is 8 kg (18 lb) to deflect a new belt 6 mm (1/2 in) in the middle of the lower span, 3. For a belt that has been run in, 7 kg (15 lb) would be sufficient force to deflect the belt 6 mm (1/2 in).
- Rotate the wobble drive through one cycle and check that the knives reach the inner end of their stroke at the same time.

NOTE: Be sure to lock the jam nuts together on all drawbolts after adjustment is completed.

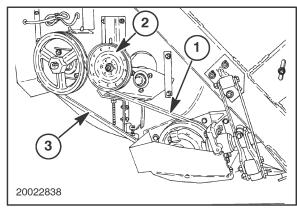
IMPORTANT: For specialty headers only - After installing a new belt and checking and setting knife register, recheck both the right and left drive belt alignment.

RIGHT KNIFE DRIVE BELT ALIGNMENT

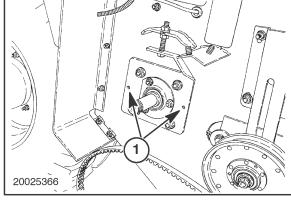
NOTE: When installing a new timing belt or to start over again to align a belt that is severely out of alignment, align the two nominal position holes, 1, in the adjusting plate with the corresponding holes in the header frame using a punch or similar tool. (Drive sprocket removed for clarity.)

NOTE: These steps should be performed if the timing belt, 1, is not tracking in the middle of the sheave, 2.

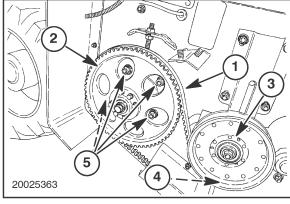
- 1. Loosen the belt idler, 3, and back off on the draw bolt, 4, to remove all belt tension.
- 2. Loosen the four nuts, 5, on the adjusting plate.



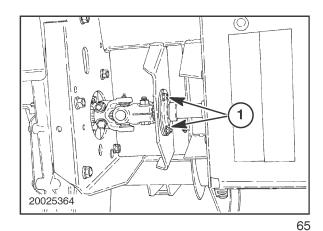
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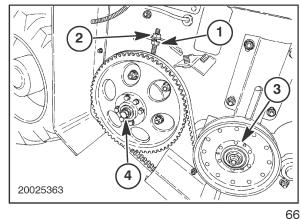
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3. Remove shield and loosen the three nuts, 1, on the inner bearing flangette.

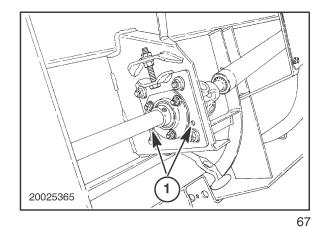


- 4. If the belt is tracking to the outside of the sheave, loosen the lower nut, 1, and turn the upper nut, 2, clockwise no more than 1/2 turn (to move the bearing mount up). If belt is tracking to the inside of the sheave, loosen the upper nut, 2, and turn the lower nut, 1, counterclockwise no more than 1/2 turn (to move the bearing mount down).
- 5. Adjust the belt idler, 3, position as needed to align with the center of the driver sheave, 4. Move washers from one side to the other as needed to have the belt track in the center.
- 6. Tighten all hardware loosened in previous steps.
- 7. Rotate sheave, 4, by hand a minimum of 3 revolutions in the operating direction and check alignment.
- 8. Repeat steps 1 through 7 as necessary until the belt tracks in the middle of the sheave.
- 9. Check the knife timing as described earlier in this section.
- 10. Recheck the belt alignment after running the header at full speed and readjust as needed.



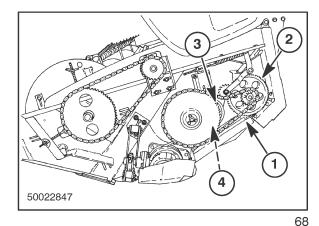
LEFT KNIFE DRIVE BELT ALIGNMENT - For Specialty Headers Only

NOTE: When installing a new timing belt or to start over again to align a belt that is severely out of alignment, align the two nominal position holes, 1, in the adjusting plate with the corresponding holes in the header frame using a punch or similar tool.

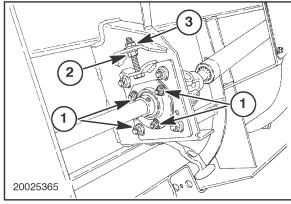


NOTE: These steps should be performed if the timing belt, 1, is not tracking in the middle of the sheave, 2.

1. Loosen the belt idler, 3, by and back off on the draw bolt, 4, to remove all belt tension.



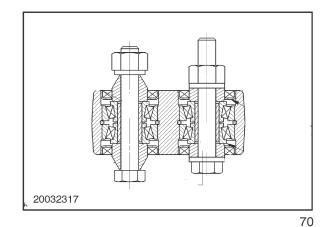
- 2. Remove shield and loosen the four nuts, 1, on the adjusting plate.
- 3. If the belt is tracking to the outside of the sheave, loosen the upper nut, 2, and turn the lower nut, 3, counterclockwise no more than 1 turn (to move the bearing mount down). If belt is tracking to the inside of the sheave, loosen the lower nut, 3, and turn the upper nut, 2, clockwise no more than 1 turn (to move the bearing mount up).
- 4. Adjust the belt idler, 3, position as needed to align with the center of the driver sheave, 4. Move washers from one side to the other as needed to have the belt track in the center.
- 5. Tighten all hardware loosened in previous steps.
- 6. Rotate shaft by hand a minimum of 3 revolutions and check alignment.
- 7. Repeat steps 1 through 6 as necessary until the belt tracks in the middle of the sheave.
- 8. Check the knife timing as described earlier in this section.
- 9. Recheck the belt alignment after running the header at full speed and readjust as needed.
- 10. Reinstall all shield and secure in the operating position.



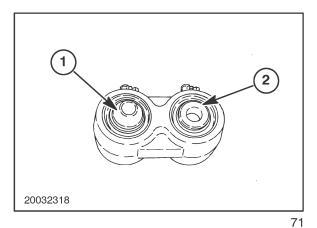
CONNECTOR LINK

IMPORTANT: Replace the entire connector assembly if any component of the bearing fails.

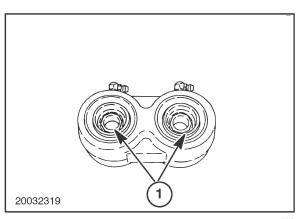
The bearings are a matched set of two cups, two cones, one cone spacer and one cup spacer. The split in the cup spacer must be centered under the grease-fitting hole.



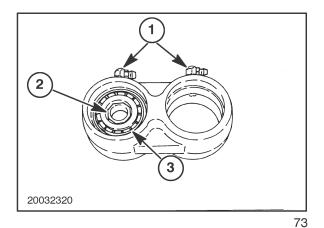
1. Remove the conical spacers, 1, and flat spacers, 2



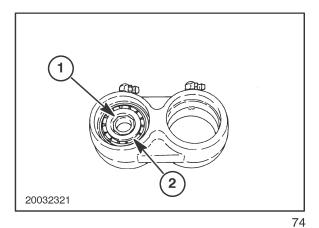
2. Remove all the seals, 1, from both sides of the connector rod.



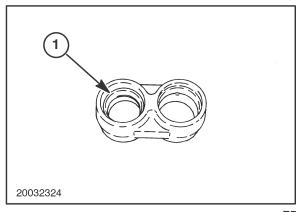
3. Remove the lube fittings, 1, and using a punch, drive the center spacer, 2, out until the cone, 3, is clear of the spacer, 2.



4. Remove the center spacer, 1, and the cone spacer, 2, along with the second cone.

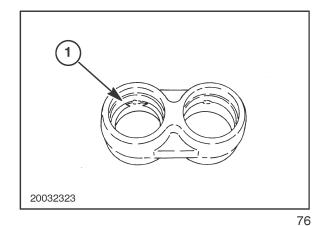


5. Remove the bearing cups, 1.



6. Rotate the cup spacer, 1, in the internal groove until the end of the spacer can be seen through the grease-fitting hole. Use a small punch through the grease-fitting hole to collapse the cup spacer until it can be removed.

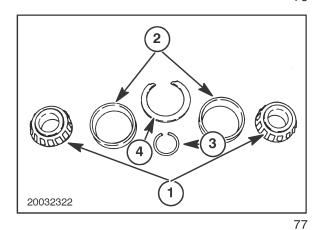
NOTE: Use care not to damage the threads of the grease fitting hole.



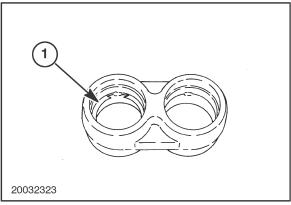
CONNECTOR LINK REASSEMBLY

Components for the matched set of bearings are as follows. Bearing cones, 1, Bearing cups, 2, cone spacer, 3, cup spacer, 4.

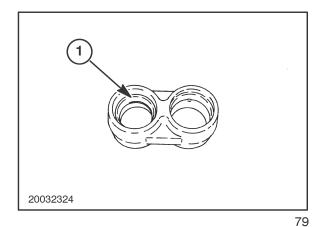
NOTE: the bearings and spacers come as a matched set. Do not interchange them with components from another set.



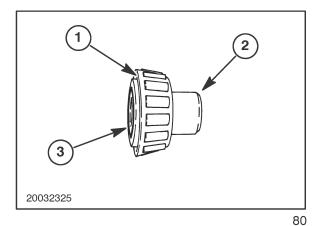
1. Install cup spacer, 1, with the split lined up with the grease-fitting hole.



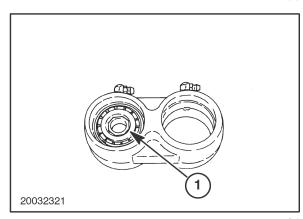
2. Install both bearing cups, 1, tight against the cup spacer.



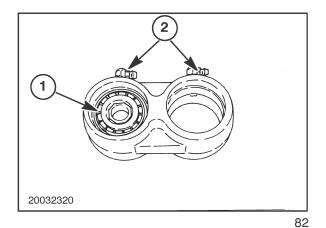
3. Pack one bearing cone, 1, with grease and install onto the center spacer, 2. The end of the spacer should be 0.8 – 1.6 mm (1/32 – 1/16 in) in from the edge of the bearing cone at, 3.



4. Assemble the bearing cone into the bearing cup. Install the cone spacer, 1.

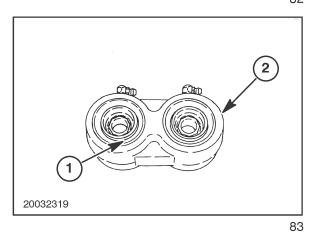


5. Pack and install the second bearing cone, 1. Install the lube fittings, 2.

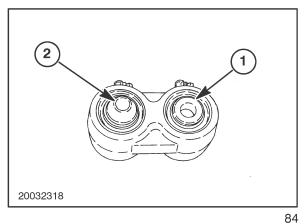


6. Grease and install the lip seals, 1, flush with the outer edge of the connector housing, 2.

NOTE: Seal lip must point outwards away from the bearing.



7. Install the seal spacers, 1, with the beveled edge towards the bearings. Install the conical spacer, 2, with the cone pointing outward.



WOBBLE CROSS SHAFT REMOVAL



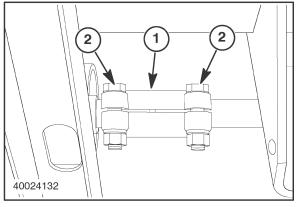
⚠ WARNING ⚠



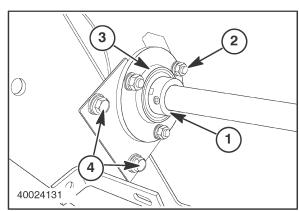
Work must be performed under the header. Failure to engage the head lift locks could result in severe personal injury.

NOTE: Refer to the Operator's Manual of the base unit, for the proper procedure for locking the lift mechanism.

- 1. Raise the header and install the header lift locks,
- 2. Remove the shielding from the front underside of the header.
- 3. Clean the paint from the shaft around the coupler, 1.
- 4. Loosen the two clamping bolts, 2.
- 5. Slide the coupler inward past the shaft joints.



- 6. Loosen the wobble shaft bearing lock collars, 1. Loosen the three cap screw nuts, 2, around the bearings, 3.
- 7. Loosen and remove the bearing mounting plate bolts, 4, and remove the mounting plate.
- 8. Tilt and remove the shaft with coupler.
- 9. Remove the keys and coupler. Clean the shaft, loosen the bearing lock collar, and remove the bearing, flangettes and collar.



WOBBLE CROSS SHAFT INSTALLATION

The cross shaft under the header, which connects the right wobble shaft to the left wobble shaft, is made in two pieces so it can be removed, or bearings replaced, without removing either wobble assembly.

WARNING A



Work must be performed under the header. Failure to engage the head lift locks, 1, could result in severe personal injury.

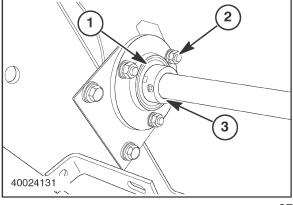
NOTE: Refer to the Operator's Manual, of the base unit, for the proper procedure for locking the lift mechanism.

NOTE: When installing the cross shaft all bearings on the cross shaft should be loose. Start tightening on the outside and tighten toward the center.

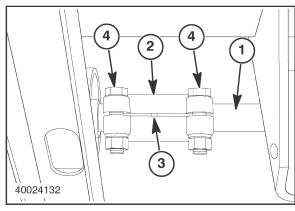
- 1. Install, if removed, the bearings, flangettes, and lock collars in the same order they were removed.
- 2. Position the bearings, 1, and flangettes approximately, and loosely install the three 3/8" x 1-1/4" carriage bolts, 2, hardened washers, lock washers and nuts.

NOTE: When installing a new wobble assembly, it is recommended to install new bearings.

- 3. Leave the lock collars, 3, loose and the bearings free to move as the shaft has to be positioned first. The wobble hub and yoke shaft need not be removed to install the wobble shaft.
- 4. Install the key into the end of the wobble cross shaft, 1, and insert the shaft into the coupler, 2.
- 5. Adjust the shaft endways so there is the same amount of gap, 3, at each end of the shaft.
- 6. Tighten the coupler clamping bolts, 4, completely.



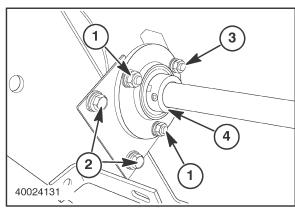
87



- 7. Tighten the two lower flangette bolts, 1, first.
- 8. Install the mounting plate and tighten mounting plate bolts, 2, completely.
- 9. Tighten the top flangette bolt, 3, last.

IMPORTANT: Failure to tighten the bearing mounting hardware securely could result in shaft failure.

- 10. Install the locking collar, 4, on the bearing.
- 11. Tighten the lock collars in the same direction as auger rotation until it locks the bearing. Then tighten the setscrew.
- 12. Reinstall all shielding.



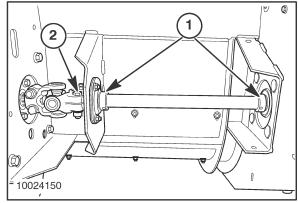
89



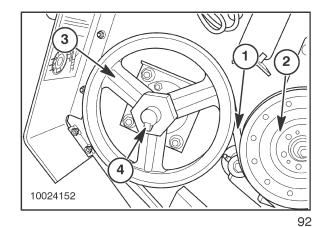
90

WOBBLE DRIVE SHAFT REMOVAL

- 1. Loosen the setscrews on the lock collars, 1, and remove the collars from the bearings.
- 2. Loosen and remove the two yoke clamping bolts, 2, on the U-joint.

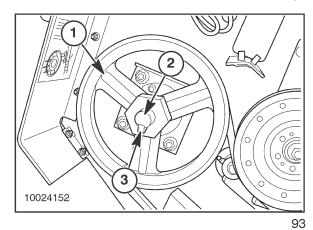


- 3. Remove the drive belt, 1, by loosening the idler pulley, 2, and sliding the pulley up.
- 4. Remove the shaft and sheave by pulling on the sheave, 3.
- 5. Separate the sheave from the shaft by removing the gib key, 4, with tapered gib key puller.



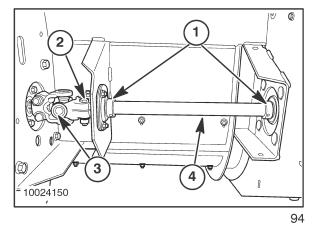
WOBBLE DRIVE SHAFT INSTALLATION

1. Attach the wobble drive sheave, 1, to the drive shaft, 2, by driving the gib key, 3, into the shaft until the key is fully seated into the sheave hub.

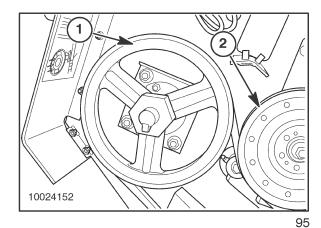


- 2. Slide the shaft into the bearings, and install the two locking collars, 1, on the shaft.
- 3. Slide the shaft into the yoke clamp, 2.

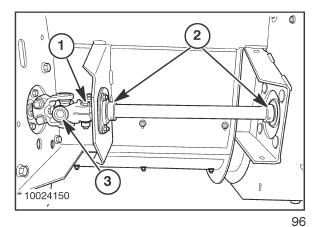
IMPORTANT: Verify that the wobble drive shaft, 4, is aligned with the yoke, 2. It is very important to have the shaft aligned with the U-joint, 3.



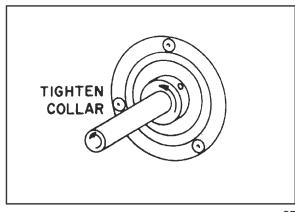
4. Line up the wobble drive sheave, 1, with the idler pulley, 2.



- 5. Tighten the yoke clamp bolts, 1, to 68 N·m (50 ft-lb).
- 6. Turn the locking collars, 2, on the support bearings.



7. Tighten the lock collars in the same direction as auger rotation until it locks the bearing. Then tighten the setscrew.



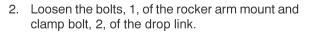
- 8. Adjust the sickle drive belt by moving idler, 1. Loosen bolt, 2, on the idler hub and move the idler with drawbolt, 3.
- 9. Adjust the belt so a force of 7 kg (15 lb) applied to the center of the belt, 4, opposite the idler deflects it 12 mm (1/2 in). When installing a new belt, adjust so it takes 8 kg (18 lb) to deflect 12 mm (1/2 in).

NOTE: Be sure to lock the jam nuts together on all drawbolts after adjustment is completed.

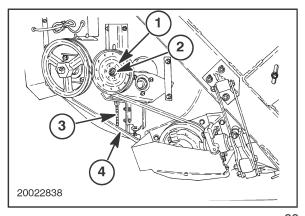
10. Reinstall all shields.

ROCKER ARM ADJUSTMENT

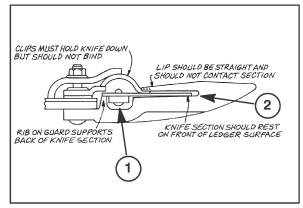
1. The knife back, 1, must be centered from front to back in the guard opening. The outer knife section must contact the ledger surface of the guard, 2.



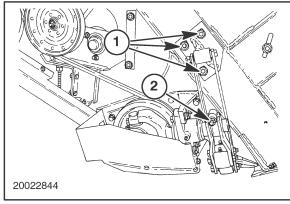
- 3. Move the rocker arm mount and drop link forward or back to center the knife back in the guard.
- 4. Move the rocker arm support down to adjust the knife to contact the ledger surface. If more adjustment is needed, lengthen the slots of the rocker arm mount.
- 5. Tighten bolts, 1, securely and Grade 8 link bolt, 2, to 115 N·m (85 ft-lb).
- 6. Adjust the other sickle drive the same way.



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HEADER DRIVE PTO AND JACKSHAFT

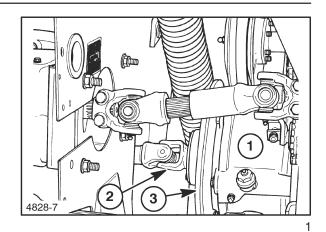
The wobble gearbox, 1, is driven by the header drive PTO, 2, which is driven by a belt from the main gearbox.

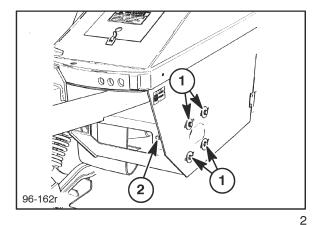
Removing

To remove the PTO, remove the four cap screws attaching the right universal joint to the flywheel, 3, on the gearbox.

Remove the four bearing support cap screws, 1, and the adjusting bolt, 2.

Remove the belt from the sheave and remove the PTO and shaft assembly.





Disassembling

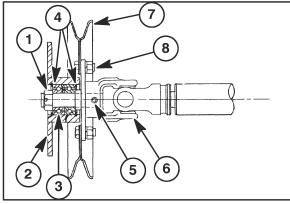
Remove the cotter pin and slotted nut, 1, from the shaft.

Remove the support, 2, and bearings, 3, from the shaft

Remove the snap rings, 4, and remove the bearing from the support.

Remove the special groove pin, 5, to remove the PTO yoke, 6, and sheave, 7, from the shaft.

Remove the sheave from the yoke by removing the four cap screws, 8.



Assembling

Attach the sheave, 7, to the yoke, 6, using four cap screws, lock washer, and nuts at 8.

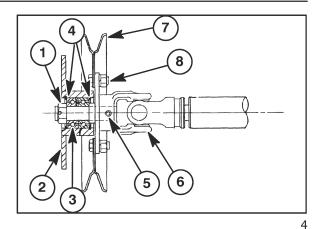
Attach the PTO yoke and sheave to the shaft using the special groove pin, 5.

Install the bearings, 3, and snap rings, 4, in the support, 2.

Install the slotted nut, 1, on the shaft. Tighten the nut to 110 N·m (80 ft. lbs.) plus enough to install the cotter pin.

Installing

Place the belt, 1, over the bearing support and sheave.



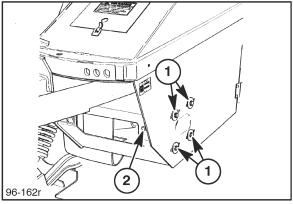
5

Attach the bearing support and sheave to the frame using four cap screws and large washers, 1. Do not tighten the cap screws until the belt is adjusted.

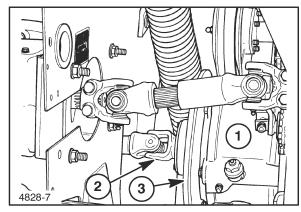
Install the adjusting bolt, 2.

Turn the adjusting bolt until it takes a force of 89 N (20 lbs.) midway between the sheaves to deflect the belt 6.3 mm (1/4").

Tighten the four cap screws at 1.

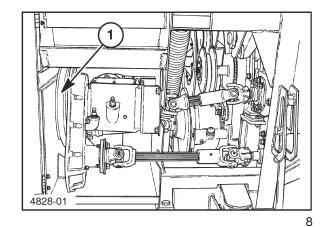


Attach the right universal joint, 2, to the flywheel, 3, on the gearbox, 1, using four cap screws and lock washers.



HEADER DRIVE BELT

The header drive belt, 1, is driven by a sheave at the left of the main gearbox. The belt must be kept properly tensioned for efficient operation of both the knife and reel. When adjusted properly, it should take a force of $89 \, \text{N}$ (20 lbs.) midway between the sheaves to deflect the belt $6.3 \, \text{mm}$ ($1/4^{\prime\prime}$).

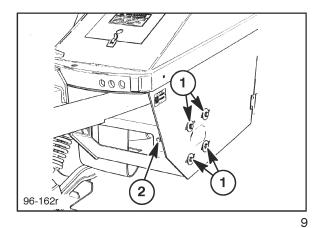


Adjusting the Belt

To adjust the belt, loosen the four bearing support cap screws, 1.

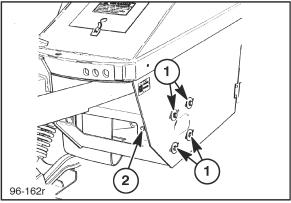
Turn adjusting bolt, 2, until it takes a force of 89 N (20 lbs.) midway between the sheaves to deflect the belt 6.3 mm (1/4").

Tighten the four cap screws at 1.



Replacing the Belt

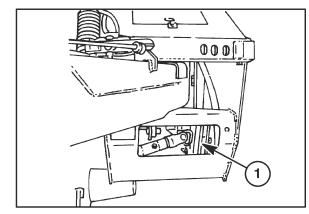
Remove the four bearing support cap screws, 1, and the adjusting bolt, 2.



Move the bearing support and sheave, 1, away from the left of the frame to provide clearance for the belt.

Thread the belt between the drive sheave on the gearbox and the frame to remove it. The gearbox does not have to be removed to replace the belt.

Install the new belt by threading it between the drive sheave on the gearbox and the frame. Place the belt over the bearing support and sheave, 1.



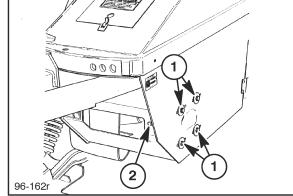
11

Attach the bearing support and sheave to the frame using four cap screws and large washers at 1. Do not tighten the cap screws until the belt is adjusted.

Install the adjusting bolt, 2.

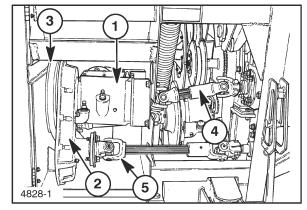
Turn the adjusting bolt until it takes a force of 89 N (20 lbs.) midway between the sheaves to deflect the belt 6.3 mm (1/4").

Tighten the four cap screws at 1.



MAIN GEARBOX

The main gearbox assembly includes a bevel gearbox, 1, and a spur gearbox, 2, driven by the bevel gearbox output shaft. A sheave, 3, on the bevel gearbox output shaft drives the header drive belt. The upper roll is driven by a PTO, 4, from the right of the output shaft. The lower roll is driven by a PTO, 5, from the bottom of the spur gearbox.

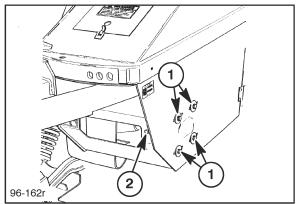


13

Removal

Remove the Drive Belt

Remove the tension from the header drive belt by loosening the four bolts at 1 and turning adjusting bolt, 2.



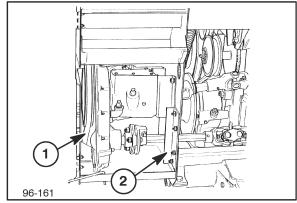
14

Open the rear door.

Remove the belt, 1, from the sheave on the gearbox. The belt can be threaded beside the sheave.

Remove the brace angle, 2.

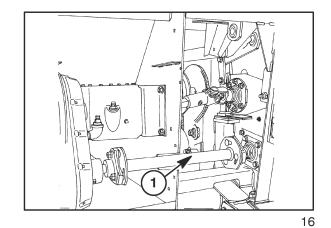
NOTE: On machines that have the door hinged on the right, it will be necessary to remove the door.



Remove the Lower Roll Drive Shaft

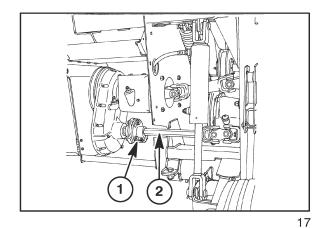
Model 489 and Model 474 below serial number 625312

Remove the lower roll drive shaft, 1, by removing the bolts at each end.



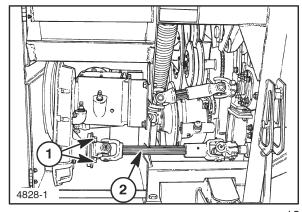
Model 492 and Model 474 above serial number 625313

Remove the cap screws from the lower roll drive coupling, 1. Pivot the hex shaft, 2, to the side.



Model 1465

Remove the lower roll drive coupling cap screws at 1. Pivot the splined shaft, 2, to the side.



18

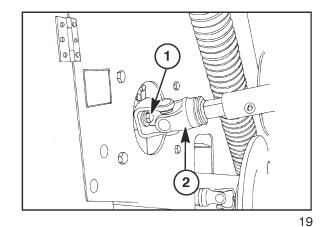
58-8

Remove the Upper Roll Drive Shaft

Models 474, 489 and 492

Remove the cap screw, washer, and lock washer at 1.

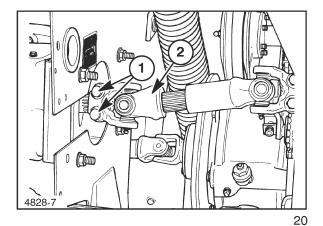
Remove the upper roll drive shaft, 2, from the gearbox shaft.



Model 1465

Remove the two yoke clamping bolts at 1.

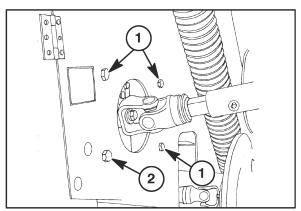
Remove the upper roll drive shaft, 2, from the gearbox shaft.



Remove the Gearbox

All models

Remove the three cap screws at 1 attaching gearbox mounting brackets to the frame. Do not remove the cap screw at 2.



Remove the cap screw, 1, attaching the spur gearbox to the frame. If there are any shims between the gearbox and mount, save them to use when reinstalling the gearbox.

Remove the gearbox mount cap screw at 2.

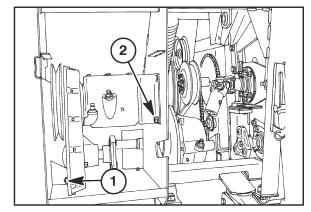


CAUTION A



Remove cap screw, 2, <u>last</u> to prevent the gearbox from accidentally shifting. the gearbox is heavy, approximately 34 kg (75 lbs.).

Remove the gearbox assembly from the machine. The drive shaft in the tongue will uncouple from the slip clutch yoke as the gearbox is removed.



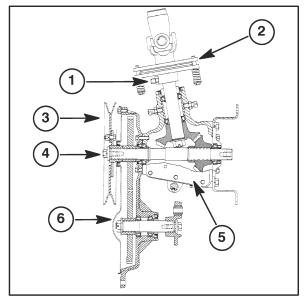
22

Disassembly

Remove the setscrews, 1, from the slip clutch, 2, and remove the slip clutch from the gearbox input shaft.

Remove the drive sheave, 3, from the bevel gearbox output shaft by removing the cap screw, lock washer, and special washer at 4.

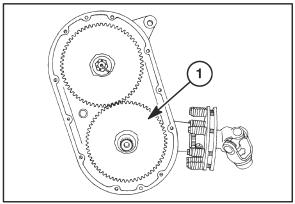
Remove the gearbox covers, 5 and 6, and drain all oil out of both gearboxes.



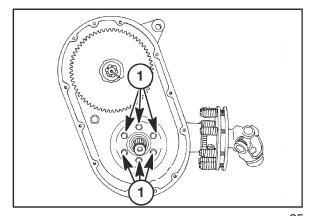
23

Spur Gearbox

Remove the upper gear, 1, from the main gearbox shaft.



Remove the six cap screws at 1 to separate the spur gearbox from the bevel gearbox.



25

Remove the cotter pin and slotted nut at 1 from the lower roll drive shaft.

Remove the washer, 2, and gear, 3, from the shaft.

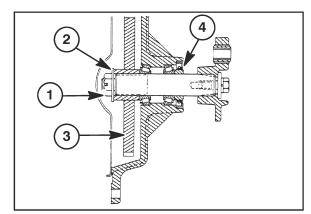
Remove the lower roll drive shaft. Install the nut on the shaft so it is flush with the threads. Use a press or a soft hammer to drive the shaft out of the gearbox and left bearing cone.

Remove the right bearing cone and the seal, 4, from the shaft.

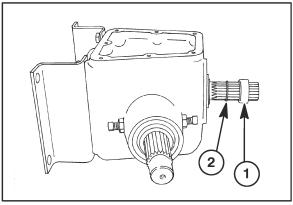
Remove the bearing cups from the housing.



Remove the spacer, 1, and O ring, 2, from the output shaft.



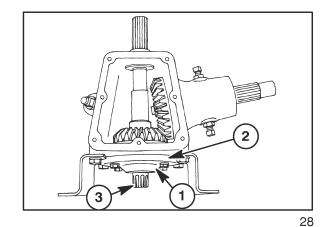
26



Remove the bearing cap, 1.

NOTE: Be careful to not damage the shims at 2 when removing the bearing cap.

Remove the shaft assembly, 3, from the housing.

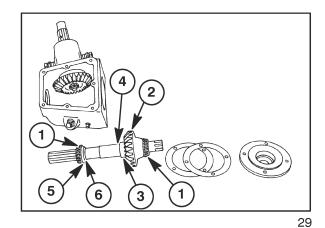


Remove the bearing cones, 1, from the shaft.

Remove the gear, 2.

Remove the spacer, 3, and snap ring 4.

Remove the spacer, 5, and snap ring 6.

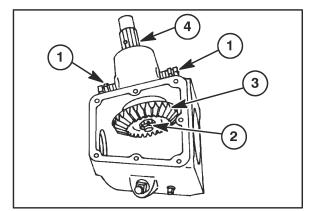


Remove the setscrews, 1, from the housing.

Remove the cotter pin and slotted nut at 2 from the input shaft.

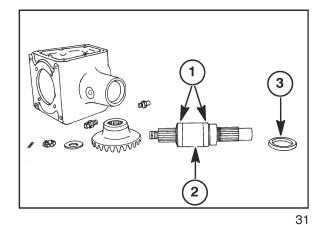
Remove the gear, 3, from the shaft.

Remove the shaft, bearing, and seal assembly, 4, from the housing.



Remove the bearings, 1, and spacer, 2, from the shaft.

Remove the seal, 3, from the shaft.

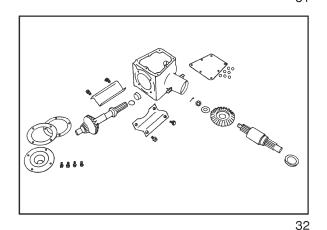


Inspection

Clean all parts to be reused.

Inspect all parts for wear or damage. Replace the parts as required.

Check for damage to the snap rings or snap ring grooves. If worn, the snap ring may fail and result in gearbox failure.



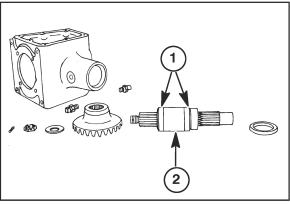
Assembly

NOTE: Pack all bearings with a NLGI #2, lithium-based, EP, multipurpose grease.

Coat the threads of the bearing cap and transfer gearbox retaining cap screws with Permatex or a noncorrosive, oil-resistant, silicone sealant (Dow Corning #735 or equivalent).

Bevel Gearbox

Install the bearings, 1, and spacer, 2, on the input shaft.



Place the shaft assembly, 1, in the gearbox.

Install the gear, 2, on the shaft.

Install a washer, 3, and slotted nut, 4, on the shaft.

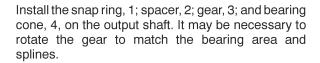
Tighten the nut to obtain a rolling torque of 0.56 - 1.1 N·m (5 - 10 in. lbs.) on the bearings.

Install a cotter pin, 5, to secure the nut.

Install a jam nut on both setscrews, 6, and install the setscrews in the housing.

NOTE: Do not tighten the setscrews, 6, in the housing at this time. The shaft and gear assembly must be moved to adjust the backlash after the output shaft is installed.

Replace the bearing cups and cones as matched sets only. Keep the shim code paper shipped with the bearing to be used at the right of the bevel gear.



Install the snap ring, 5; spacer, 6; and bearing cone, 7. on the shaft.

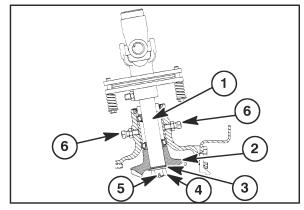
Be sure all parts are seated against the snap rings.

Install the bearing cup in cap, 8.

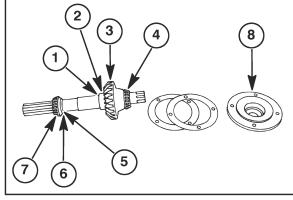
Place the shaft assembly, 1, in the gearbox.

The end cap, 2, must be shimmed correctly to provide the proper location of the bevel gear to match the input gear.

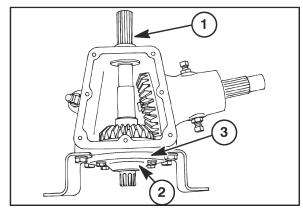
Install the same thickness of shims at 3 as were removed if the original bearing, end cap, and housing are being reused at the right of the bevel gear.



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IF A NEW BEARING, END CAP, OR HOUSING IS BEING USED, the shim thickness required will have to be determined as follows:

Add the following three numbers:

- a. The number on the paper with the new bearing.
- b. The number stamped on the gearbox at X. If the rear gearbox mounting bracket is installed, remove it to check the stamped number.
- c. The number stamped on the cap at Y.

The total number is the amount of shims in thousands that should be used between the cap and gearbox.

Example:

Number on paper with bearing	4
Number on gearbox	18
Number on bearing cap	_5
Tota	l 27

Use shims that total 0.027" thick between the cap and gearbox.

Install the correct amount of shims at 1 as determined previously and install the bearing cup and the bearing cap, 2.

Coat the threads of the bearing cap retaining cap screws with Permatex or a noncorrosive, oilresistant, silicone sealant (Dow Corning #735 or equivalent).

Install the bearing cup, 3, in the housing.

Determine the number of shims required at 4 as follows:

Attach the transfer gearbox housing, 5, to the bevel gearbox housing.

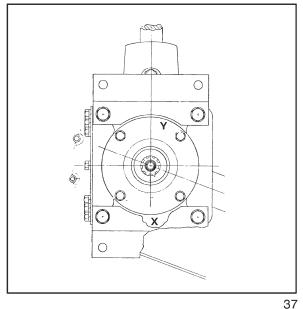
Measure the gap between the housings.

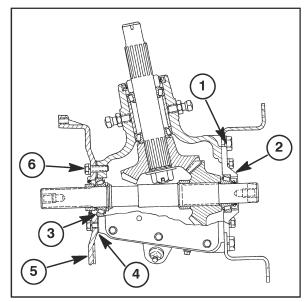
Remove the transfer housing and install 0.003" fewer shims than the gap.

Reinstall the transfer housing.

Check the rolling torque on the output shaft. Rolling torque should be 0.56 - 1.1 N·m (5 - 10 in. lbs.). Adjust the thickness of shims at 4 until the rolling torque is correct. Shim thicknesses available are 0.003", 0.005", 0.007", and 0.020".

When the torque is correct, remove the cap screws at 6 and coat them with Permatex or a noncorrosive, oil-resistant, silicone sealant (Dow Corning #735 or equivalent). Reinstall the cap screws.





Adjust the backlash between the bevel gears.

Move the input shaft assembly, 1, into position so that the pinion gear meshes with the bevel gear, 2.

Check the backlash of the gears using a dial indicator. The backlash should be 0.1 - 0.3 mm (0.004 - 0.012") at the tightest point. Reposition the input shaft to change the adjustment.

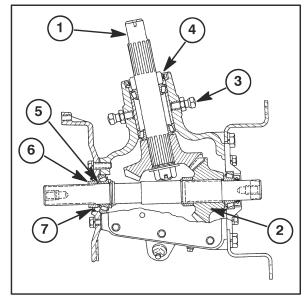
When the backlash is correct, tighten both setscrews, 3, to 68 N·m (50 ft. lbs.). Tighten the jam nuts on the setscrews.

Rotate the shaft several times to make sure the gears are mating properly and that there is no binding.

Coat seal, 4, with grease. Install the seal in the housing with the metal flange to the outside.

Coat O ring, 5, with grease. Install the O ring and spacer, 6, on the output shaft. The O ring should be against the bearing cone. The notch in the spacer should fit over the O ring.

Install seal, 7, with the metal flange to the outside.



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Spur Gearbox

Install the bearing cups, 1, in the housing.

If installing the shaft in a Model 1465, place the seal, 2, over the spacer on the shaft.

Install the right bearing cone, 3, on the shaft.

Place the shaft assembly in the housing and install the left bearing cone, 4.

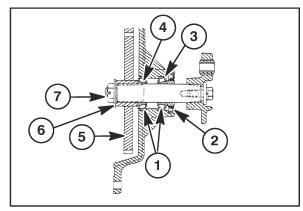
Install gear, 5, on the shaft.

Install washer, 6, and slotted nut, 7, on the shaft.

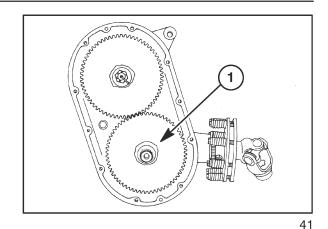
Tighten the nut to obtain a rolling torque of 0.56 - 1.1 N·m (5 - 10 in. lbs.) on the bearings.

If installing the shaft in a Model 474, 489 or 492, install the seal, 2, on the shaft.

NOTE: The Model 1465 shaft includes the hub for the roll drive. Seal, 2, must be installed before the shaft is installed.



Install gear, 1, on the shaft.



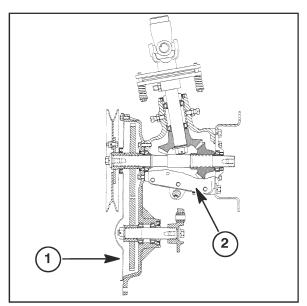
Clean the mating surfaces of the housings and covers.

Apply a 1/8" continuous bead of a noncorrosive, oil-resistant, silicone sealant (Dow Corning #735 or equivalent) to the housings.

Install the cover, 1, on the spur gearbox. Be sure that the two dowel pins in the housing extend 6.3 mm (1/4") beyond the housing.

Install the cover, 2, on the bevel gearbox.

Coat the cover retaining cap screws with Permatex or a noncorrosive, oil-resistant, silicone sealant (Dow Corning #735 or equivalent).



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Coat seal, 1, with grease and place over the hub of sheave, 2, with the metal shield facing the hub.

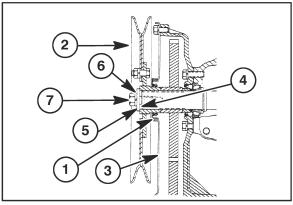
NOTE: For machines with a separate hub and sheave, be sure to attach the sheave to the hub before installing the hub on the gearbox.

Install the sheave and seal on the shaft. Align the seal with the bore in the cover, 3, as the sheave is being installed.

Seat the seal in the cover so it is flush with the outside of the lip on the cover.

Clean the area at the end of the shaft. Fill the cavity, 4, at the end of the shaft with a noncorrosive, oil-resistant, silicone sealant (Dow Corning #735 or equivalent).

Install a special washer, 5; lock washer, 6; and 1/2'' x 1-1/4'' cap screw, 7.



Models 474, 489, and 492

Install the lower roll drive hub, 1, on the tapered spline of the shaft.

Install the special washer, lock washer, and cap screw, 2. Tighten the cap screw to 109 N·m (80 ft. lbs.) torque.

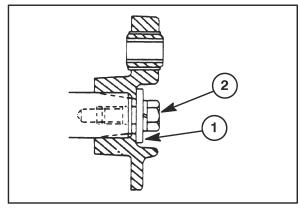
Strike the hub with a punch or driver and heavy hammer.

Retighten the center bolt.

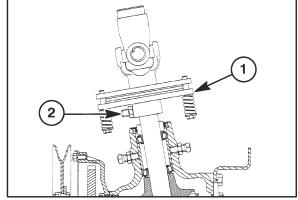
Continue to strike the hub and retighten the cap screw until the torque does not decrease after striking.

NOTE: All tapered spline connections must be properly seated to prevent loosening.

Install the slip clutch, 1, on the input shaft with the setscrew hole in the hub aligned with the tapered hole in the shaft. Place a jam nut on setscrew, 2. Install and tighten the setscrew and then tighten the jam nut.



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Installation

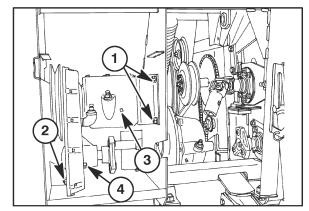
Install the Gearbox in the Machine

Install four $1/2^{\prime\prime}$ x 1 $^{\prime\prime}$ cap screws, lock washers, and nuts at 1.

Install a $1/2" \times 1-1/2"$ cap screw, lock washer, and nut at 2.

NOTE: On machines with a solid lower roll drive tube, be sure that the gearbox shaft is aligned with the lower roll shaft before tightening the cap screws. It may be necessary to use shims between the gearbox and mount at 2.

Fill both gearboxes with API GL5, 80W-90 gear oil until oil flows out of the check plug holes, 3 and 4.



Install the Upper Roll Drive Shaft

Models 474, 489, and 492

Install the upper roll drive shaft, 2, on the gearbox shaft.

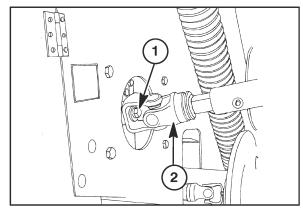
Install the cap screw, washer, and lock washer at 1. Tighten the cap screw to 108 N·m (80 ft. lbs.).

Hammer seat the yoke by striking the hub with a punch or driver and heavy hammer.

Retighten the center bolt.

Continue to strike the hub and retighten the cap screw until the torque does not decrease after striking.

NOTE: All tapered spline connections must be properly seated to prevent loosening.

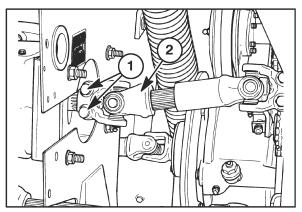


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Model 1465

Install the upper roll drive shaft, 2, on the gearbox shaft.

Install the two yoke clamping bolts at 1. Be sure to torque the bolts to a minimum of 113 N·m (83 ft. lbs.).



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Install the Lower Roll Drive Shaft

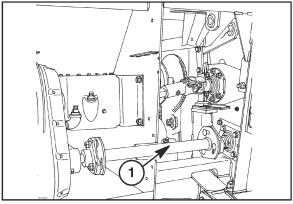
Model 489 and Model 474 below serial number 625312

Install the lower roll drive tube, 1, by installing three $1/2'' \times 2-1/4''$ short square neck carriage bolts at each end.

Be sure the bushings in the couplers are in good condition.

Install shim washers as required to fill any gaps between the coupler and drive tube.

Time the rolls before tightening the coupling hardware.



Model 492 and Model 474 above serial number 625313

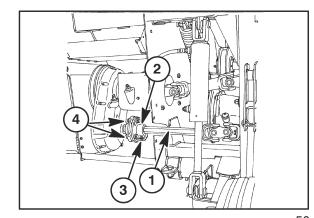
Pivot the hex shaft, 1, and coupling, 2, into position.

Loosen the clamping bolt, 3, in the coupling.

Install the lower roll drive coupling cap screws, 4.

Tighten the coupling clamping bolt.

Time the rolls before tightening the coupling hardware.



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Model 1465

Pivot the splined shaft, 2, into position.

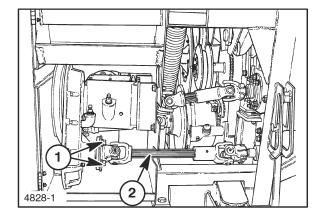
NOTE: If the telescoping sections of the shaft were separated, be sure the universal joints are in phase before reinstalling the shaft.

Install the four lower roll drive coupling flange head cap screws at 1.

Time the rolls before tightening the coupling hardware.

NOTE: There are two sets of threaded holes in the flange on the gearbox shaft. If the timing cannot be adjusted when the cap screws are loosened, remove the cap screws and install in the other set of holes in the flange. If possible, use the set of holes that places the cap screws in the middle of the slots.

Recheck the timing adjustment after repositioning the drive hub.



SECTION 58 - ATTACHMENTS/HEADERS

Chapter 3 - Gearbox (Center Pivot)

CONTENTS

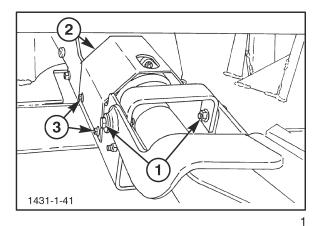
Section	Description	Page
	Center Pivoting Gearbox - Removal	58-2
	Center Pivoting Gearbox - Disassembly	58-5
	Inspection	58-10
	Center Pivoting Gearbox - Assembly	58-10
	Gearbox Support Plate Bushing Replacement	58-21
	Center Pivoting Gearbox - Installation	58-22
	Guidance Link Shimming	58-25

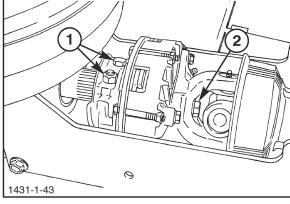
CENTER PIVOTING GEARBOX - REMOVAL

NOTE: It is easier to remove the gearbox with the tongue positioned on the right side of the header and the header lowered.

- 1. Remove the steering linkage by removing the two 1/2" x 2-1/4" bolts, 1. The guidance link can then be slid out of the channel on the tongue.
 - Remove the shielding, 2, over the slip clutch by removing the four retaining bolts, 3. Lift the shielding off the center gearbox channel.
- 2. Loosen the two cap screws, 1, and locknuts on the clamp hub at the rear of the slip clutch. Loosen the cap screw, 2, inside the slip clutch yoke, but do not remove it from the shaft. Tap the rear of the clutch housing with a soft faced hammer to remove it from the taper on the gearbox shaft; the center retaining bolt will prevent the clutch from falling off the shaft.
- Remove the center retaining bolt, 2, and slide the clutch assembly off the center gearbox input shaft. With both sections of the secondary drive shaft supported, slip the drive shaft apart to remove the slip clutch and rear section of the drive shaft.

IMPORTANT: The slip clutch end of the secondary PTO shaft is very heavy and awkward; use caution not to drop the shaft assembly as personal injury or damage to the clutch may result.



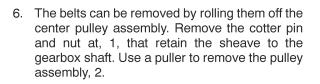


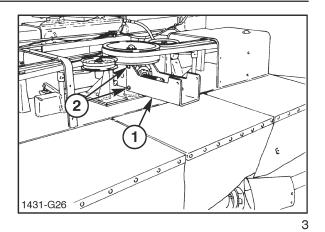
 Remove the hardware retaining the center and middle left shields, and remove the shielding from the unit.

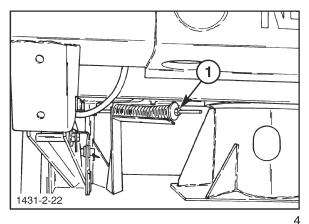
Remove the channel, 1, from the gearbox by removing the four 1/2" x 1" G8 retaining bolts at 2.

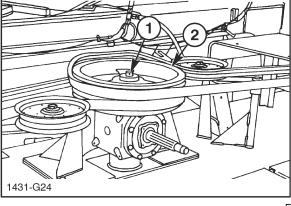
NOTE: Do not mix the channel mounting bolts with other hardware; the channel mounting bolts are Grade 8 bolts, and must be reinstalled with the channel.

5. Remove the tension on the left side belt by loosening the jam nut and adjusting nut, 1, on the spring tension rod until the belt can be removed from the center sheave. Repeat the process on the right side belt spring tension rod so that the right side belt may be removed from the center sheave.



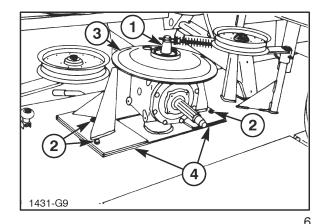




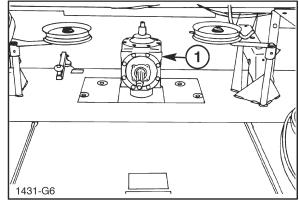


7. Remove the woodruff key, 1, from the output shaft of the gearbox. Remove the four 1/2" x 1 1/2" flange bolts at 2, that hold the gearbox support, 3, in place, and carefully lift the support off the gearbox. Remove the plastic thrust washer from the neck of the gearbox.

NOTE: There are shims used between the upper and lower support plates for the gearbox at 4; note the location and quantity of these shims for reassembly.



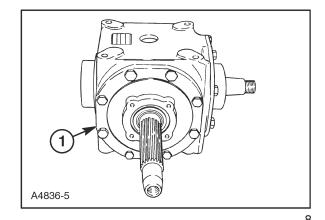
8. The gearbox assembly, 1, can now be lifted from the lower support plate; remove the plastic thrust washer from the lower neck of the gearbox, and set it aside.



CENTER PIVOTING GEARBOX - DISASSEMBLY

NOTE: During disassembly keep track of location and number of all shim packs. Use the same shim packs during re-assembly.

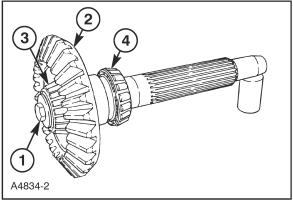
1. Remove the input shaft bearing cap, 1, by removing the eight cap screws; pry the cover off the gearbox.



2. Remove the input shaft from the gearbox.

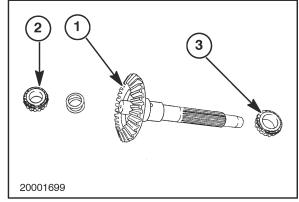
1431 - SN 650152 and below 1432 - SN 639638 and below

 Remove the M10 x 22 cap screw, 1, and washer that retains the bearings and gear to the shaft. After the cap screw is removed, use a hydraulic press to push off the gear, 2, and the bearing, 3. Remove the key in the shaft and push off the bearing, 4, shims, and washer.



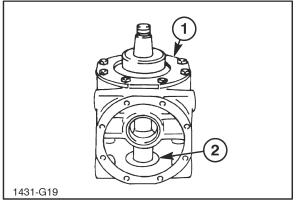
1431 - SN 650153 and above 1432 - SN 639639 and above

 Set the shaft in a hydraulic press and remove gear, 1, and bearing, 2. Capture all shims behind the bearing. Turn the shaft over, and remove bearing, 3. Capture all shims behind the bearing.



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 Remove the eight bolts retaining the output shaft bearing cap, 1. Pry the bearing cap off the gearbox. Lift the output shaft out of the gearbox until the lower bearing, 2, is pulled completely out of its bore in the gearbox.



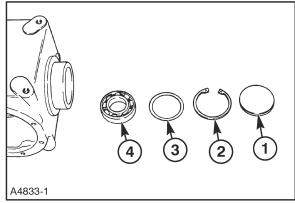
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4. Slide a long punch through the gearbox past the output shaft lower bearing, and use a hammer to drive the plug, 1, from the bottom of the gearbox housing.

NOTE: Use caution to prevent damage to the shims when driving the plug out of the gearbox.

Remove the retaining ring, 2, and shims, 3, from the gearbox housing.

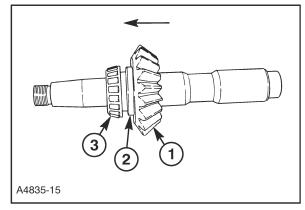
Position the output shaft against the inner structure of the gearbox, and use a hammer and punch to drive output shaft out of the lower bearing, 4. The output shaft may now be removed from the gearbox.



5. Position the output shaft assembly in a press, supporting it under the gear.

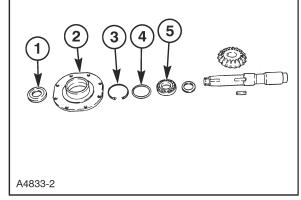
Press the gear, 1, spacer, 2, and the bearing, 3, off the end of the shaft.

NOTE: The gear, spacer and the bearing are pressed off in the direction of the arrow.



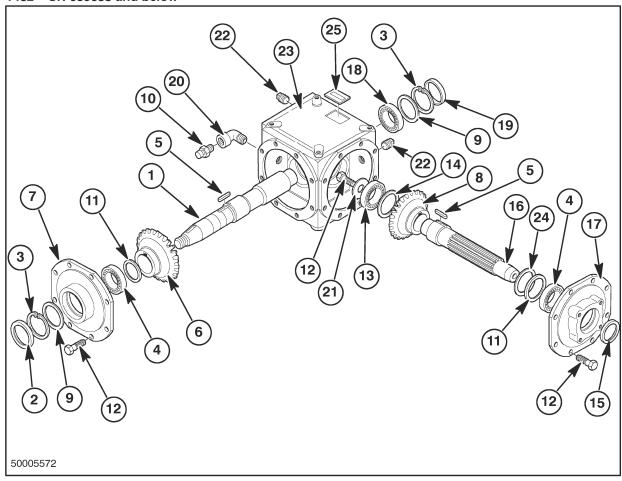
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6. Remove oil seal ,1, from output shaft bearing cap, 2. Remove snap ring, 3, and shim pack, 4. The bearing cup can then be removed from the output shaft cover, 2. The remaining bearing cup can now be removed from the gearbox assembly.



1431 - SN 650152 and below

1432 - SN 639638 and below



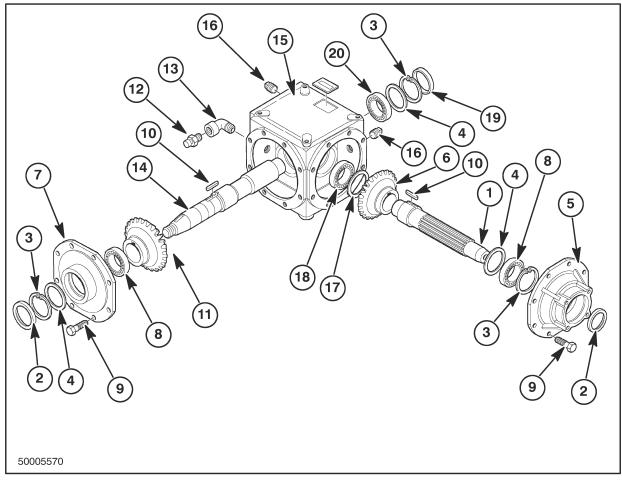
Parts identification

- 1. Shaft
- 2. Seal
- 3. Snap Ring
- 4. Bearing
- **5.** Key
- 6. Pinion
- 7. Cover
- 8. Crown Wheel
- 9. Shim Kit
- 10. Breather
- 11. Washer
- **12.** Bolt

- 13. Bearing
- 14. Shim Kit
- **15.** Seal
- 16. Shaft
- **17.** Cover
- 18. Bearing
- **19.** Cap
- 20. Elbow
- 21. Blank Washer
- 22. Pipe Plug
- 23. Casing
- 24. Shim Kit
- **25.** Plate

1431 - SN 650153 and above

1432 - SN 639639 and above



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Parts identification

- 1. Shaft
- 2. Seal
- 3. Snap Ring
- 4. Shim Kit
- 5. Cover
- 6. Crown Wheel
- 7. Cover
- 8. Bearing
- 9. Bolt
- **10.** Key

- 11. Pinion
- 12. Breather
- 13. Elbow
- **14.** Shaft
- 15. Casing
- **16.** Plug
- 17. Shim Kit
- 18. Bearing
- **19.** Cap
- 20. Bearing

INSPECTION

- Discard the shaft seals and plug, 19, Figures 15 and 16. Replace any worn or pitted bearings. Replace all bearings if gearbox is contaminated with debris from an internal failure.
- 2. Clean all parts thoroughly.
- 3. Inspect all keyways and splines for damage. Replace any damaged or worn shafts.
- 4. Inspect all gears and gear teeth for damage and wear. Replace any worn or damaged gears.
- Inspect the gearbox housing and all bearing end caps for wear or cracks. Replace any worn or damaged parts.

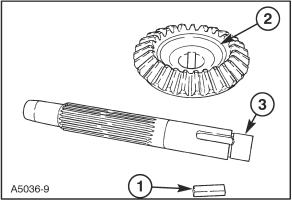
CENTER PIVOTING GEARBOX - ASSEMBLY

1. Assemble the input shaft:

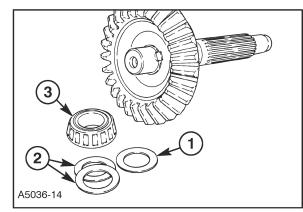
1431 - SN 650152 and below 1432 - SN 639638 and below

- Install the straight key, 1, into the keyway on the input shaft, and press the large gear, 2, onto the shaft over the key; orient the gear so the gear teeth face the shouldered end, 3, of the shaft after it is installed. Push the gear onto the shaft until it is just past the shoulder on the shaft.
- Install the washer, 1, and original shim pack, 2, over the end of the shaft against the shoulder. Press the bearing, 3, onto the shaft until it is tight against the shim pack, washer and shoulder on the shaft.

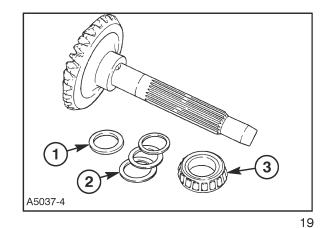
NOTE: It will be necessary to use a pusher pipe of appropriate size to press the bearing onto the shaft, as the shaft will protrude out past the seated bearing.



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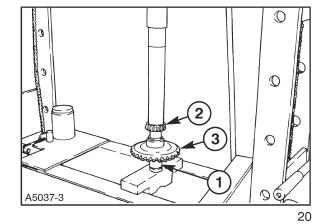


 Install the spacer, 1, and original shim pack, 2, for the outer bearing over the shaft against the gear. Slide the outer bearing, 3, over the end of the shaft.



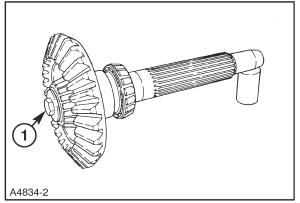
Support the shaft and gear assembly in a press on the pusher pipe, 1, used to press on the inner bearing. Use a long piece of pipe to press the outer bearing cone, 2, onto the shaft against the gear, 3. Continue to press the outer bearing cone and gear downwards until they are securely seated against the inner bearing cone, shim pack and washer.

NOTE: Failure to securely seat all components together may result in gearbox failure.



 Install the cap screw, 1, and washer into the inner end of the shaft, and torque to 60 - 70 N·m (44 - 52 ft.-lbs.).

NOTE: The cap screw and washer will seat against the end of the shaft, and not the bearing cone. The cap screw and washer simply guard against the possibility of the shaft being removed from the assembled gearbox.



1431 - SN 650153 and above

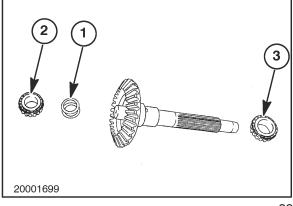
1432 - SN 639639 and above

- Set the key into the keyway of the input shaft.
 Orient the gear so the gear teeth face away from the spline end of the shaft. Press the large gear onto the shaft over the key until it is seated against the shoulder.
- Slide the original shim pack, 1, over the end of the shaft against the gear. Press the inner bearing, 2, onto the shaft until it is tight against the shim pack.
- Slide the washer over the shaft, and set against the shoulder. Press the outer bearing, 3, onto the shaft until it is tight against the washer.

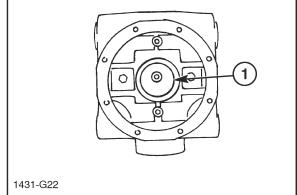
NOTE: Failure to securely seat all components together may result in gearbox failure.

 Install the bearing cup, 1, into the gearbox housing inner web, and into the input shaft bearing cap.

NOTE: Do not install a shaft seal in the bearing cap at this time.



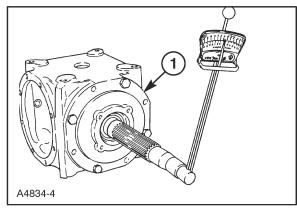
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2. Install the input shaft assembly into the gearbox housing, and install the bearing cap, 1, using four cap screws equally spaced around the cap; torque the cap screws to 60 - 70 N⋅m (44 - 52 ft.-lbs.). Rotate the shaft assembly a minimum of two full turns to seat the bearing rollers, and then push and pull on the shaft to determine if the shaft has any end play. If no end play is detected, install a 1/2" cap screw into the end of the input shaft, and use an inch pound torque wrench to measure the input shaft rolling torque. The rolling torque should be 6 - 9 kg. cm. (5 - 8 in. lbs.).

NOTE: Make two complete revolutions of the input shaft to seat the bearing rollers before measuring the rolling torque.



3. Adjust input shaft rolling torque:

1431 - SN 650152 and below 1432 - SN 639638 and below

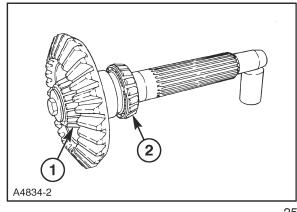
- If the input shaft assembly is determined to have end play or insufficient rolling torque, it will be necessary to disassemble the input shaft, and add shims between the inner bearing, 1, and the shoulder on the shaft.
- If the input shaft was determined to have an excessive amount of rolling torque, it will be necessary to disassemble the input shaft, and remove shims between the inner bearing, 1, and the shoulder on the shaft.

NOTE: Do not add or remove shims between the outer bearing, 2, and spacer, as this will affect the gear position in the gearbox.

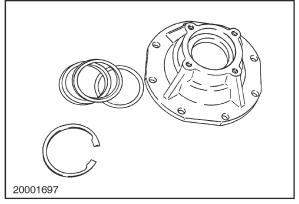
1431 - SN 650153 and above

1432 - SN 639639 and above

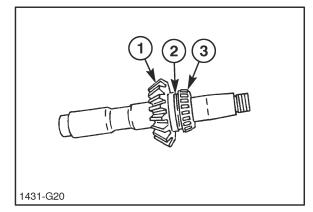
- If the input shaft assembly is determined to have end play or insufficient rolling torque, it will be necessary to add shims between the snap ring and bearing cup in the input shaft housing.
- If the input shaft was determined to have an excessive amount of rolling torque, it will be necessary to remove shims between the snap ring and bearing cup in the input shaft housing.
- The shims used in the gearbox are available in 0.012", 0.016", and 0.020" thicknesses. The shim pack thickness can be changed in 0.004" increments by removing a shim and installing the next size thicker shim to increase rolling torque or next size thinner shim to decrease rolling torque.
- Repeat steps 2 and 3 until the input shaft is properly adjusted. Once adjusted, remove the bearing cap and input shaft, and set aside.



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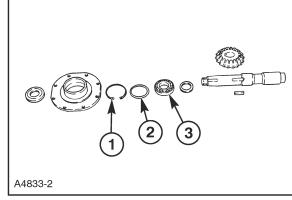
4. Assemble the output shaft by installing the key into the keyway in the shaft; press the pinion gear, 1, onto the shaft over the key until it is seated against the shoulder on the shaft. Pack the upper output shaft bearing with grease prior to installation. Install the spacer, 2, over the shaft against the gear, and press the bearing, 3, onto the shaft against the spacer.



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5. Install the snap ring, 1, into the output shaft bearing cap. Position the original shim pack, 2, against the snap ring, and install the bearing cup, 3, in the bearing cap.

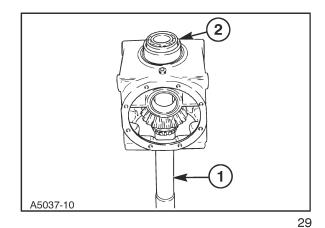
NOTE: Do not install a shaft seal in the bearing cap at this time.

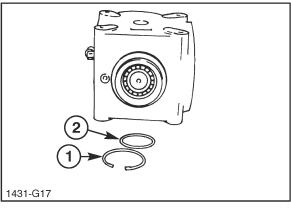


6. Insert the output shaft assembly into the gearbox housing, and support the entire assembly on the pusher pipe, 1, used to press the bearing and pinion gear onto the output shaft. Position the lower output shaft bearing, 2, into the housing, and drive the bearing over the end of the output shaft. Ensure the bearing is seated against the shoulder on the shaft.

NOTE: The lower output shaft bearing is a slip fit in the housing, and a press fit on the output shaft. Drive against the inner race of the bearing to prevent damage to the bearing.

7. Install the snap ring, 1, and original shim pack, 2, in the housing.





8. Apply sealant to the flange of the output shaft bearing cap, 1, and install it onto the gearbox over the output shaft. Install the 8 cap screws, and torque to 60 - 70 N·m (44 - 52 ft.-lbs.). Rotate the output shaft two full revolutions to seat the bearing rollers. Install a dial indicator on the end of the output shaft, and pull on the shaft to measure the end play. Add or remove shims, 2, Figure 30, as necessary to obtain 0 - 0.05 mm (0 - 0.002") of end play on the shaft.

NOTE: Make certain the shaft does not have any preload on it, or bearing failure may result.

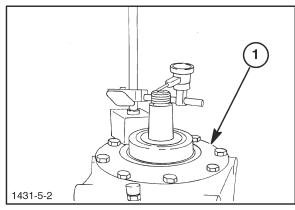
NOTE: Do not add or remove shims between the bearing cup and snap ring in the output shaft bearing cap, as this will affect the gear position in the gearbox.

 Apply a bluing compound to the gear teeth of the pinion gear, 1, and the input gear, 2. Install the input shaft assembly into the gearbox, and retain the bearing cap using four cap screws, torqued to 60 - 70 N·m (44 - 52 ft.-lbs.).

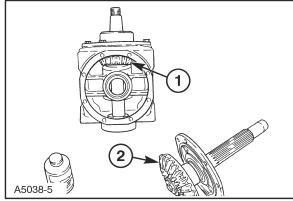
While holding the output shaft to apply a load to it, rotate the input shaft counterclockwise several revolutions, as viewed from the end of the shaft. This will seat the bearing rollers, and will also mark the gear contact pattern in the bluing compound on the gear teeth.

- 10. Install a dial indicator onto the gearbox, so that the indicator stem is engaged against a spline on the input shaft. While holding the output shaft securely against rotation, rotate the input shaft back and forth to measure the backlash between the gears. The proper backlash reading at the input shaft splines is 0.002" to 0.004"; this indicates a true backlash of 0.008" to 0.018" between the gears.
- 11. Remove the input shaft from the gearbox, and check the gear contact pattern on the gears; the contact pattern should be 40% central-toe, as shown in Figure 36.

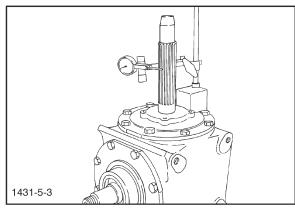
If the backlash was found to be incorrect, or if the contact pattern is not located properly, the gearbox will need to be reshimmed.



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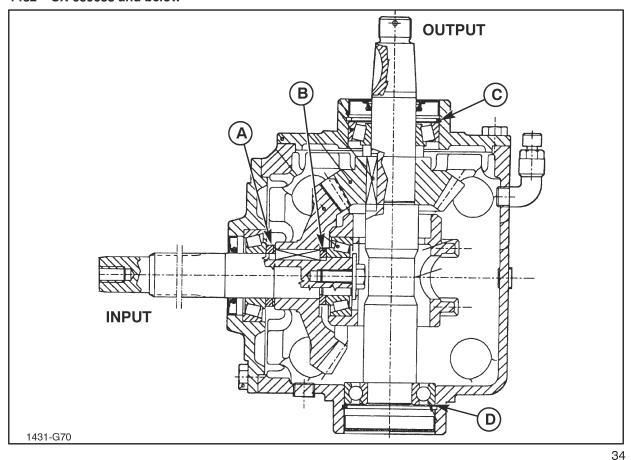


<u>--</u> 32



1431 - SN 650152 and below

1432 - SN 639638 and below

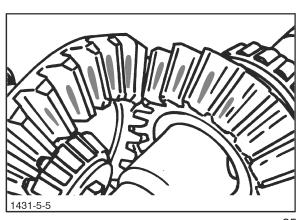


Backlash Adjustment

To adjust backlash, move shims from one end of the input shaft to the other. To increase backlash, move shims from A, between the outer bearing cone and gear, to B, between the inner bearing cone and the shoulder. To decrease backlash, remove shims from B, and install them at A.

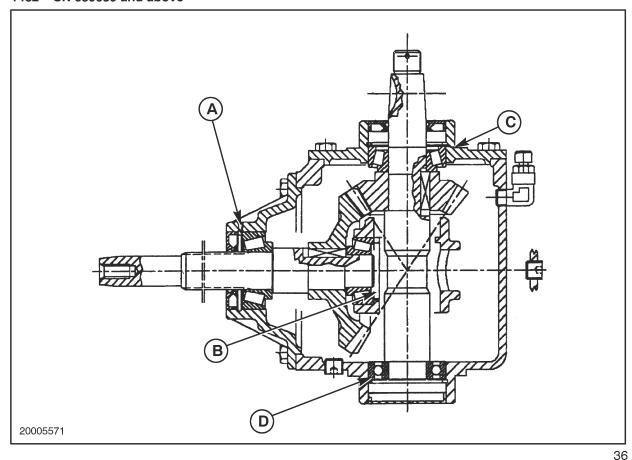
The shims used in the gearbox are available in 0.012", 0.016" and 0.020" thickness'; shifting the input shaft 0.004" will change the backlash between the gears approximately 0.0024". To shift the shaft 0.004" inwards (to decrease backlash), remove a 0.020" or 0.016" shim at B, and substitute the next size smaller shim, and then remove a 0.012" or 0.016" shim at A, and substitute the next size larger shim.

NOTE: Because the shims used at each end of the input shaft are different in diameter, use caution to keep track of the shims used, so that the shaft preload adjustment does not change.



1431 - SN 650153 and above

1432 - SN 639639 and above

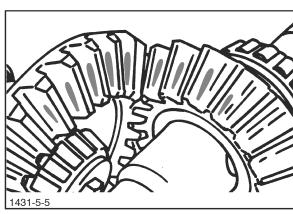


Backlash Adjustment

To adjust backlash, move shims from one end of the input shaft to the other. To increase backlash, move shims from A, between the outer bearing cone and snap ring, to B, between the inner bearing cone and the gear. To decrease backlash, remove shims from B, and install them at A.

The shims used in the gearbox are available in 0.012", 0.016" and 0.020" thickness'; shifting the input shaft 0.004" will change the backlash between the gears approximately 0.0024". To shift the shaft 0.004" inwards (to decrease backlash), remove a 0.020" or 0.016" shim at B, and substitute the next size smaller shim, and then remove a 0.012" or 0.016" shim at A, and substitute the next size larger shim.

NOTE: Because the shims used at each end of the input shaft are different in diameter, use caution to keep track of the shims used, so that the shaft preload adjustment does not change.



Gear Contact Pattern

To adjust the gear contact pattern, move shims from one end of the output shaft to the other, to reposition the pinion gear.

If the contact pattern is high (towards the top of the tooth) on the pinion, 1, and low (towards the root of the tooth) on the gear, 2, remove shims from C, Figures 35 or 36, between the snap ring and bearing cup, and add them at D, between the ball bearing and the snap ring, to move the pinion out of mesh with the gear.

If the contact pattern is low on the pinion, 1, and high on the gear, 2, remove shims from D, Figures 35 or 37, between the ball bearing and snap ring, and add them at C, between the snap ring and the bearing cup, to move the pinion further into mesh with the gear.

The shims used on the output shaft are the same on both ends, and are available in 0.012", 0.016" and 0.020" thicknesses. To shift the pinion 0.004" inwards (to increase mesh), remove a 0.020" or 0.016" shim at D and position it at C, and move the next size smaller shim (0.016" or 0.012") from C to position D. Use the opposite of this process to move the pinion out of mesh.

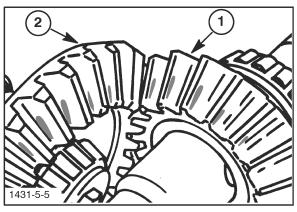
Repeat as necessary until the back lash and gear contact patterns are correct.

12. Remove the input shaft bearing cap, 1, from the gearbox, and drive a new shaft seal, 2, in flush with the outer face of the bearing cap. Apply sealant to the flange of the bearing cap, and reinstall it over the input shaft on the gearbox. Install the eight cap screws, and torque them to 60 - 70 N·m (44 - 52 ft.-lbs.).

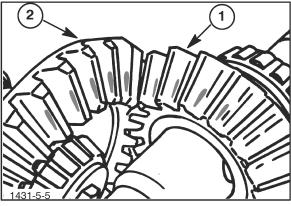
Slide the output shaft seal, 3, over the output shaft, using caution to prevent rolling the seal lip outwards; carefully drive the seal into the bearing cap until flush with the outer face.

Drive a new plug, 4, into the bottom of the gearbox until flush with the housing.

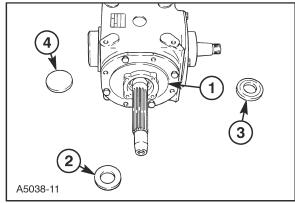
Apply sealant to the drain plug, and install it in the gearbox housing, if previously removed.



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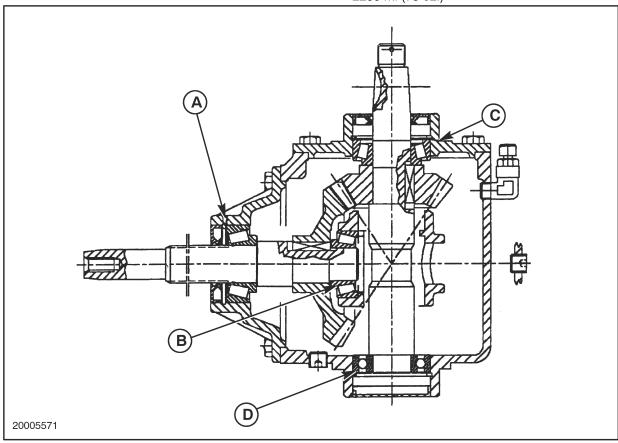
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13. Fill the gearbox with fresh API GL5 80W90 gear oil to the level plug. Add oil through the breather.

Model 1431 SN 650152 and below Model 1432 SN 639638 and below 2000 ml (68 oz.)

Model 1431 SN 650153 and above Model 1432 SN 639639 and above 2200 ml (75 oz.)



GEARBOX SUPPORT PLATE BUSHING REPLACEMENT

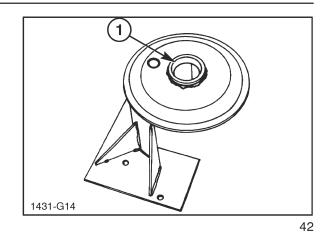
Prior to installation of the center pivoting gearbox, inspect the condition of the bushings, 1, in the upper and lower support plates. If the bushings are worn excessively, or are a loose fit on the hubs of the gearbox, they must be replaced.

On the lower support, pull the bushing out of the hub on the support plate. Install the new bushing so that two of the grease holes are positioned an equal distance away from the grease zerk hole; drive the bushing in flush with the top of the hub. The bushing holes should be lined up with the grease groove in the hub.

NOTE: Do not position a bushing hole over the grease zerk hole, as this will prevent grease from being evenly distributed around the diameter of the gearbox hub.

On the upper support, pull the bushing, 1, and the seal plate, 2, out the bottom of the hub on the support plate. Inspect the seal plate for wear or damage to the inner diameter; replace it if any wear is noticed. Position the seal plate, 2, in the hub against the shoulder, and install the new bushing so that two of the grease holes are positioned an equal distance away from the grease zerk hole. Drive the bushing in flush with the bottom face of the hub. The bushing holes should be lined up with the grease groove in the hub.

NOTE: Do not position a bushing hole over the grease zerk hole, as this will prevent grease from being evenly distributed around the diameter of the gearbox hub.



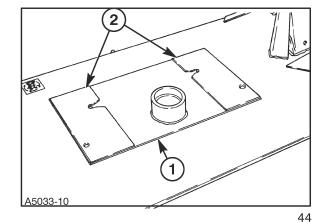
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CENTER PIVOTING GEARBOX - INSTALLATION

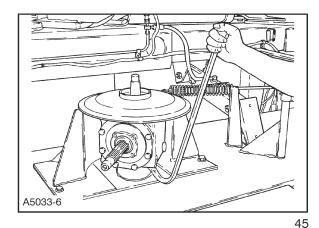
 Position the gearbox lower support plate, 1, over the weld nuts in the header frame, and install the original shim packs, 2, on the lower support plate. It may be necessary to apply a small amount of sealant to the shims to keep them in place during gearbox installation.

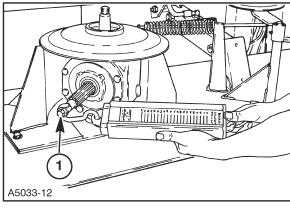


2. Install a plastic thrust washer over the lower neck on the gearbox, and set the gearbox in place on the lower support plate. Install another plastic thrust washer over the upper neck on the gearbox, and position the upper support plate over the gearbox. Install the four 1/2" x 1-3/4" cap screws, and torque to 113 N·m (83 ft.-lbs.).

The gearbox must be free to pivot with a force of 14 - 68 N·m (10 - 50 ft.-lbs.) applied against the end of the input shaft, but the gearbox must have no end play between the upper and lower support plates. Use a pry bar under the gearbox to determine if any end play exists; if so, shims must be removed between the upper and lower support plates.

When there is no end play detected, install a 1/2'' cap screw, 1, partially into the end of the input shaft. Hook a spring scale over the cap screw, and measure the force required to rotate the gearbox; it should be between 14 - 68 N·m (10 - 50 ft.-lbs.). If the force required to rotate the gearbox is excessive, shims must be added between the upper and lower support plates.

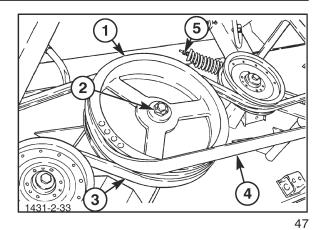


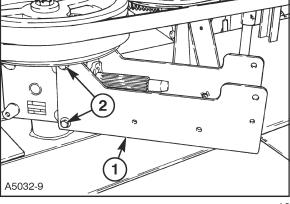


- 3. Install the woodruff key into the keyway on the output shaft, and apply a permanent lubricant to the end of the shaft. Position the pulley, 1, down over the shaft and key, and install the washer and castellated nut, 2, on the end of the shaft. Tighten the nut to 203 N·m (150 ft.-lbs.). Hit the sheave inner hub with a sharp blow from a soft faced or dead-blow hammer to ensure the sheave is fully seated on the taper on the shaft, and retorque the nut. Install the cotter pin to secure the nut.
- 4. Install the right side drive belt, 3, in the lower set of grooves on the center sheave; tighten the right side belt tensioner adjusting nut until the spring length matches the length of the gauge. Tighten the jam nut to secure.

Reinstall the left side belt, 4, on the center sheave. Tighten the left side belt tensioner adjusting nut, 5, until the spring length matches the length of the gauge. Tighten the jam nut to secure.

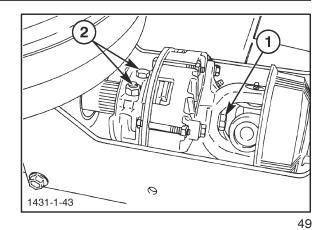
5. Reinstall the channel, 1, to the gearbox using four 1/2" x 1" Grade 8 cap screws; torque the cap screws, 2, to 159 N·m (117 ft.-lbs.). Reinstall the center and left side shielding on the unit using the previously removed hardware; position the center shield under the left and right middle shields. Install all hardware loosely to ensure a proper fitup before tightening retaining bolts.



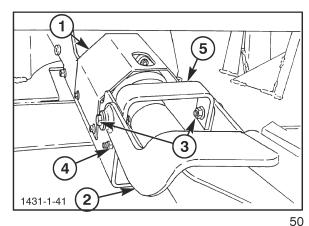


6. Slide the slip clutch onto the center gearbox input shaft as far as possible. Thread the bolt, 1, inside the slip clutch hub into the end of the shaft, and tighten as much as possible to pull the slip clutch hub securely onto the tapered end of the gearbox shaft. Tighten the two 1/2" x 3" Grade 8 cap screws, 2, and locknuts to 87 N·m (64 ft.-lbs.).

NOTE: Do not overtorque; locknuts are Class C, and are limited to 87 N m (64 ft.-lbs.).

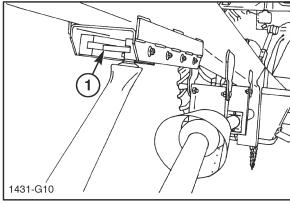


 Reinstall the shield, 1, over the slip clutch and secure using the four bolts previously removed. Position the shield so that the access hole is forward.



8. Slide the plate, 1, on the end of the guidance link into the plastic slides on the tongue. Position the clevis end of the guidance link, 2, Figure 51, over the end of the center pivoting gearbox channel, and install two 1/2" x 2-1/4" bolts, 3, hardened washers and spacer bushings through the clevis, channel and U-bracket. Secure with flange nuts and torque to 113 N·m (83 ft.-lbs.). The bolts should tighten down on the spacer bushings, leaving the guidance link clevis free to pivot.

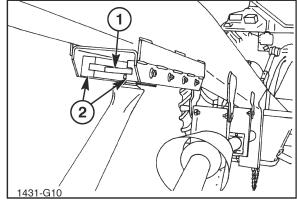
NOTE: Ensure the 5/16" x 1" bolt and locknut, 4, Figure 50, are installed and secure, as this prevents brace, 5, from pivoting against the drive shaft.



GUIDANCE LINK SHIMMING

Slide the front of the guidance link, 1, in the plastic slides, 2. There should be no more than 1.5 mm (0.060") clearance between the plate and the slides at any point, but the plate should not bind in the slides. Add or remove shims between the slides and the frame on both sides to achieve the appropriate clearance. Tighten the 1/4" cap screws and locknuts to remove all play between the plastic slides and the mount, and then turn each locknut one full turn.

NOTE: Do not overtighten, or plastic slides will be damaged.



SECTION 58 - ATTACHMENTS/HEADERS

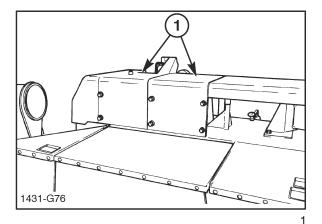
Chapter 4 - Gearbox (Right Hand)

CONTENTS

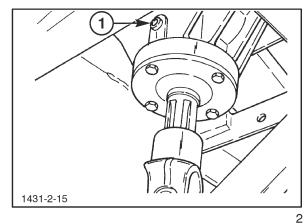
Section	Description	Page
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	Inspection	58-10
	Right-hand Gearbox - Assembly	58-12
	Right-hand Gearbox - Installation	58-20

RIGHT-HAND GEARBOX - REMOVAL

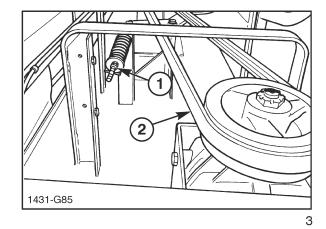
1. Remove the hardware retaining the two right side shields, 1, and lift the shields off the unit.



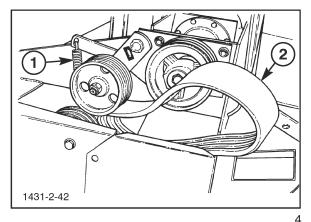
2. If the gearbox is being removed for disassembly, drain the oil out of the gearbox by removing the plug, 1, on the lower neck of the gearbox.



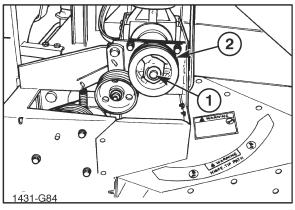
3. Remove the tension on the belt by loosening the jam nut and adjusting nut, 1, on the spring tension rod until the belt, 2, can be removed from the gearbox sheave.



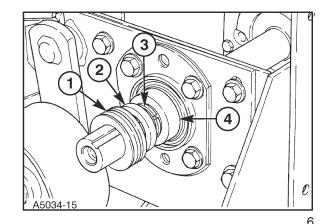
4. Loosen the spring, 1, for the conditioner drive belt, 2, by loosening the jam nut and adjusting nut; remove the drive belt from the sheaves.



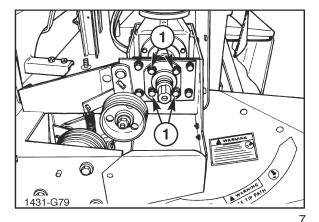
5. Block the cutter bar using wood blocking between the discs, or a bar through the right end tower. Remove drive pulley retaining bolt, 1, and pull the drive pulley, 2, off the conditioner drive shaft.



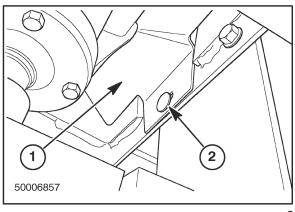
6. Remove the washers, 1, spacer, 2, and snap ring, 3, off the end of the shaft. Remove the lock collar, 4, using a hammer and punch to drive the lock collar opposite the direction of rotation (clockwise as viewed from the end of the shaft) until it loosens up. Remove the lock collar from the shaft.



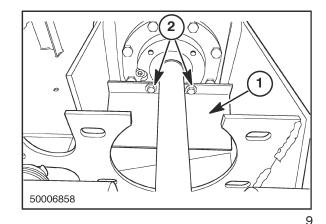
7. Remove the four bolts, 1, retaining the bearing flangettes, and remove the outer flangette. Clean the shaft using emery cloth, and slide the bearing off the shaft.



8. Detach the inner gearbox shroud, 1, by taking out carriage bolt and nut, 2.



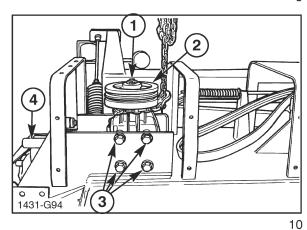
9. Detach the outer gearbox shroud, 1, by turning out cap screws, 2.

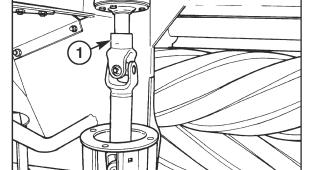


10. Remove the cotter pin retaining the castellated nut. With the cutter bar blocking or bar in the right end tower in place, break the drive sheave retaining nut, 1, loose; leave the nut snug against the sheave. Wrap a chain under the drive sheave, 2, and use a hoist to support the gearbox. Remove the eight bolts, 3, retaining the gearbox. Use the hoist to lift the gearbox out of the header frame.

NOTE: As the gearbox is removed the conditioner drive shaft, 4, will need to be tipped out of the frame.

11. As the gearbox is raised out of the frame, the gearbox shaft will slide out of the cutter bar drive shaft, 1.





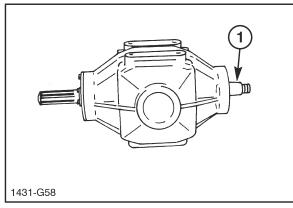
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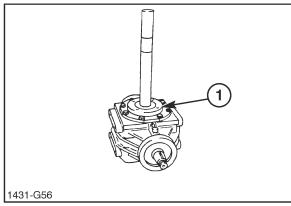
RIGHT-HAND GEARBOX - DISASSEMBLY

NOTE: Keep track of the number and location of all shim packs. During assembly, the shim packs will be installed in their original location.

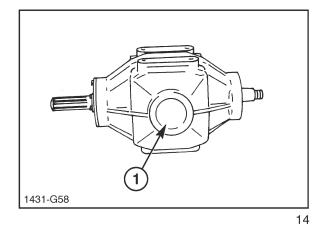
- 1. Place the gearbox on a table. Pull the drive sheave off the input shaft of the gearbox. Remove the woodruff key from the keyway, 1, on the input shaft.
- 2. Remove the eight cap screws securing the conditioner drive shaft bearing cap, 1. Pry the bearing cap off, and lift the shaft assembly out of the gearbox.



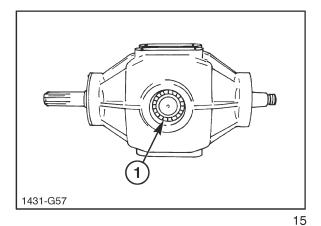
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3. Remove the rear plug, 1, from the gearbox using a hammer and long punch to drive the plug out of the housing.

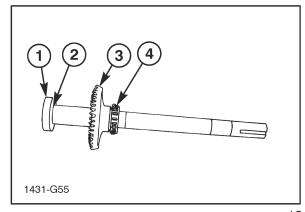


4. Remove the snap ring and the shim pack at 1, from the rear of the gearbox.

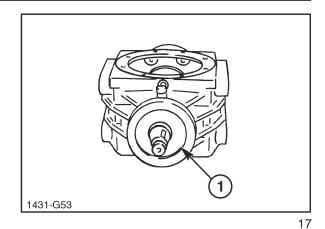


5. Disassemble the conditioner drive shaft by pressing off the ball bearing, 1; remove the washer, 2, from the end of the shaft. Clean all the paint and dirt off the shaft and press the gear, 3, and bearing, 4, off the shaft.

Remove the straight key from the keyway in the shaft after removing the gear.

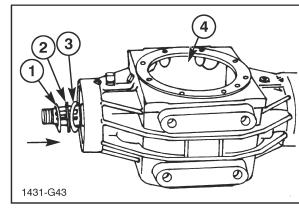


6. Remove the snap ring and dust cover at, 1, at the input shaft end of the gearbox housing.



7. Remove the snap ring, 1, shim pack, 2, and the spacer, 3. Press the input shaft (in the direction of the arrow) through the outer bearing into the housing. Remove the input shaft from the gearbox housing through the right side opening, 4.

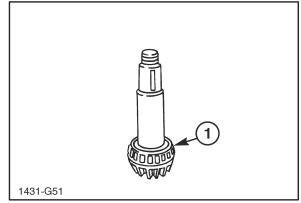
NOTE: The input shaft must be removed from the gearbox before the lower output shaft may be removed.



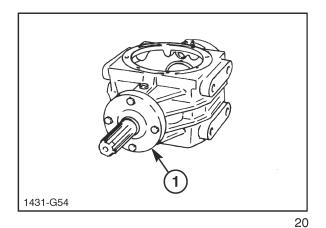
18

8. Use a split bearing puller to remove the bearing from the input shaft. Press the bearing, 1, off the end of the shaft. Remove the shim pack that was installed between the bearing and the gear, and set it aside.

NOTE: Keep track of the number and location of all shim packs. During assembly, the shim packs will be installed in their original location.

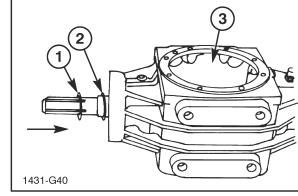


9. Remove the four cap screws securing the lower output shaft end cap, 1, and remove the end cap.



10. Remove the snap ring, 1, shim pack, 2, and spacer from the lower output shaft. Press the shaft (in the direction of the arrow) through the bearing into the housing. Remove the shaft from the gearbox housing through the right side opening, 3.

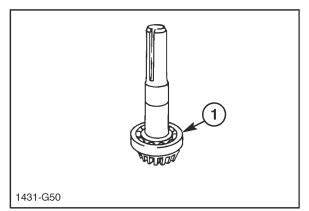
NOTE: The input shaft must be removed from the gearbox before the lower output shaft may be removed.



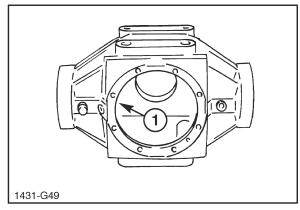
21

11. Use a split bearing puller to remove the ball bearing on the lower output shaft, and press the ball bearing, 1, off the shaft. Remove the shim pack that was installed between the bearing and the gear, and set it aside.

NOTE: Keep track of the number and location of all shim packs. During assembly, the shim packs will be installed in their original location.



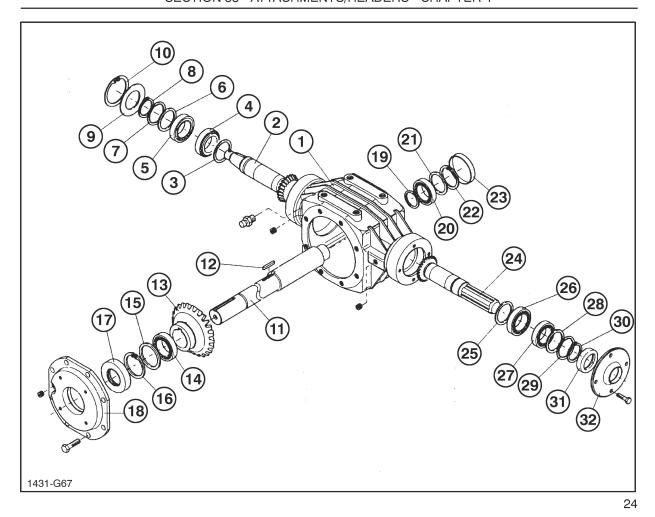
12. Remove the bearing cup from the conditioner drive shaft bearing cap, and from the input shaft position, 1, in the gearbox housing.



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INSPECTION

- 1. Discard the shaft seals and plug, 23, Figure 24. Replace any worn or pitted bearings. Replace all bearings if gearbox is contaminated with debris from an internal failure.
- 2. Inspect all keyways and splines for wear. Replace and damaged or worn assemblies.
- 3. Inspect all gears and gear teeth for wear and damage. Replace any worn or damaged parts.
- 4. Inspect the gearbox housing and all bearing caps for wear and cracks. Replace any worn or damaged parts.



Parts Identification

- 1. Gearbox housing
- 2. Input shaft
- 3. Shim kit
- 4. Bearing cup and cone
- 5. Sealed ball bearing
- 6. Washer
- 7. Shim kit
- 8. Snap ring
- 9. Cover
- 10. Snap ring
- 11. Conditioner drive shaft
- **12.** Key
- **13.** Gear
- 14. Bearing cup and cone
- 15. Shim kit
- 16. Snap ring

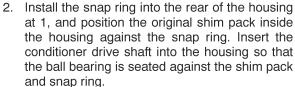
- **17.** Seal
- 18. Conditioner drive shaft bearing cap
- 19. Washer
- 20. Ball bearing (conditioner drive shaft)
- 21. Shim kit
- 22. Snap ring
- **23.** Plug
- 24. Lower output shaft
- 25. Shim kit
- 26. Ball bearing
- 27. Ball bearing
- 28. Washer
- 29. Shim kit
- 30. Snap ring
- **31.** Seal
- 32. Lower output shaft end cap

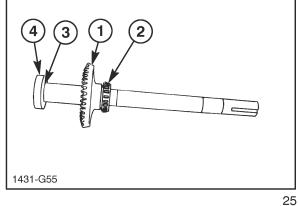
58-11

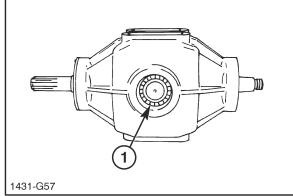
RIGHT-HAND GEARBOX - ASSEMBLY

1. Install the straight key into the keyway on the conditioner drive shaft, and press the gear, 1, onto the shaft over the key until the gear is seated against the collar on the shaft. Press the bearing, 2, onto the shaft against the gear.

Position the washer, 3, over the end of the shaft, and press the ball bearing, 4, onto the shaft until it is seated against the washer and shoulder in the shaft.



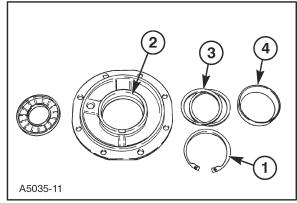




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3. Install the snap ring, 1, into the conditioner drive shaft bearing cap, 2. Position the original shim pack, 3, against the snap ring, and install the bearing cup, 4. Carefully lower the bearing cap assembly over the conditioner drive shaft, and bolt it to the housing using four cap screws, evenly spaced, and torqued to 51 - 62 N·m (38 -46 ft.-lbs.).

NOTE: Do not install the shaft seal into the bearing cap at this time.

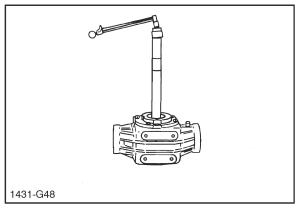


4. Rotate the shaft two full revolutions to seat the bearings. Thread a 5/8" x 1" cap screw into the end of the conditioner drive shaft, and use an inch-pound torque wrench to check the rolling torque on the shaft. The conditioner drive shaft must have zero end play, and 0 - 3.5 kg. cm. (0 - 3 in. lbs.) of rolling torque. Add or remove shims between the ball bearing and the snap ring at 1, Figure 27, to adjust the shaft.

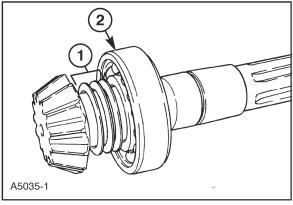
NOTE: Do not add or remove shims between the bearing cup and snap ring in the bearing cap to adjust rolling torque, as this will affect the gear position in the gearbox.

Once the shaft is properly adjusted, remove the bearing cap assembly and conditioner drive shaft assembly from the gearbox and set aside. Remove the shims at the snap ring in the housing, and set aside with the shaft, so they do not become lost during reassembly.

5. Install the previously removed shim pack, 1, over the lower output shaft, and press the ball bearing, 2, onto the shaft until it is seated against the shim pack and gear.

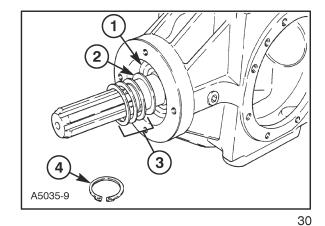


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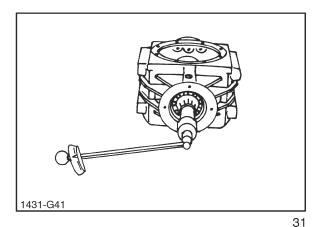


6. Install the lower output shaft assembly into the gearbox until the ball bearing is seated against the shoulder in the housing. Insert the outer ball bearing, 1, over the shaft and into the gearbox until it is also seated against its shoulder in the housing. Install the washer, 2, original shim pack, 3, and snap ring, 4, to retain the shaft.

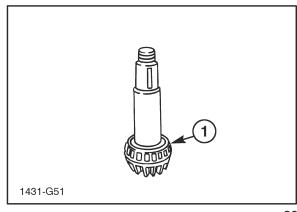
NOTE: Make certain the snap ring is properly seated in the groove in the shaft.



7. Select a socket that just fits over the shaft, and lock it to the shaft by sliding a hex key between the shaft and the socket. Attach an inch-pound torque to the socket, and check the rolling torque of the shaft. Add or remove shims behind the snap ring, 4, Figure 30, as necessary to obtain 0 - 3.5 kg. cm. (0 - 3 in. lbs.) of rolling torque.

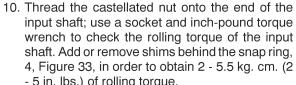


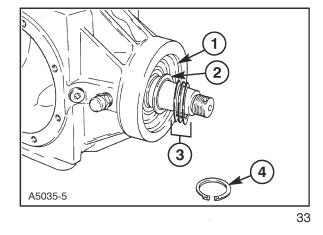
8. Install the original shim pack over the input shaft, and press a new bearing, 1, over the shaft against the shim pack and gear.



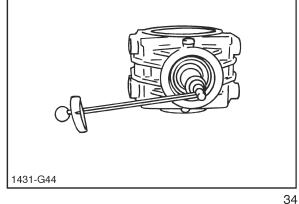
9. Install the bearing cup into the gearbox housing, and insert the input shaft into the gearbox. Hold the input shaft in place while inserting the sealed ball bearing, 1, over the input shaft and into the housing until it is seated against the shoulder in the housing. Install the washer, 2, and original shim pack, 3, over the shaft, and retain using a snap ring, 4.

NOTE: Make certain the snap ring is properly seated in the groove in the shaft.

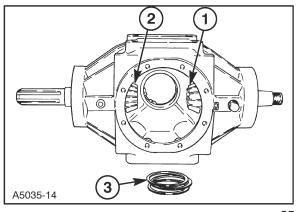




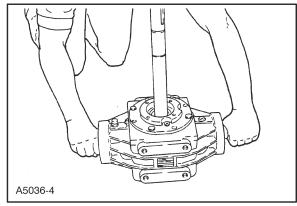
input shaft; use a socket and inch-pound torque wrench to check the rolling torque of the input shaft. Add or remove shims behind the snap ring, 4, Figure 33, in order to obtain 2 - 5.5 kg. cm. (2 - 5 in. lbs.) of rolling torque.



11. Applying bluing compound to both the input shaft pinion, 1, and lower output shaft pinion, 2, gears. Install the shim pack, 3, into the rear of the housing, and lower the conditioner drive shaft assembly into the gearbox. Install the conditioner drive shaft bearing cap and retain using four cap screws, equally spaced, and torqued to 51 - 62 N·m (38 - 46 ft.-lbs.).



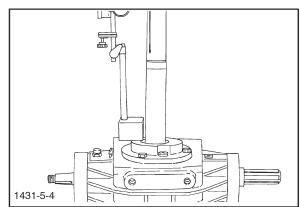
12. Hold the lower output shaft to apply a load to the gearbox, and rotate the input shaft several times in order to mark the gear contact patterns into the bluing on the pinion gears.



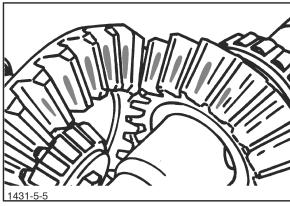
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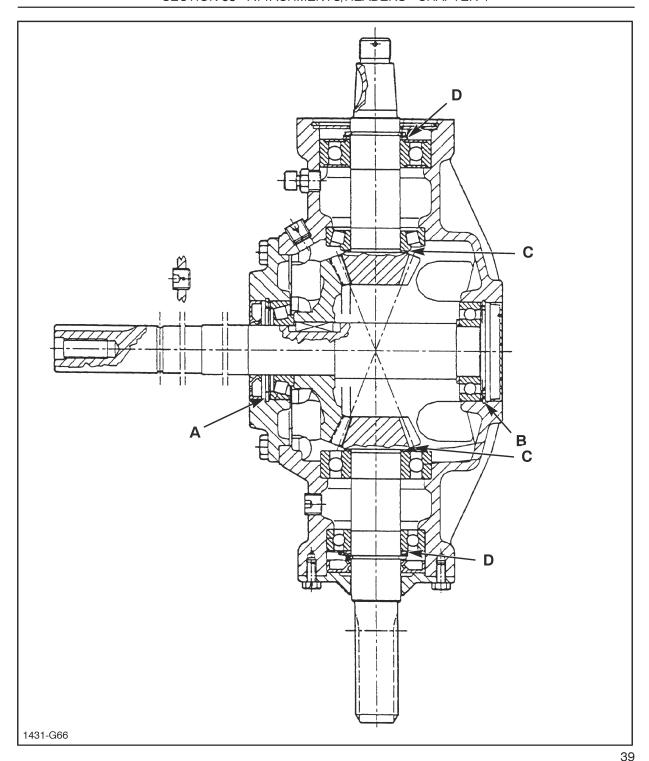
13. Install a dial indicator onto the gearbox, so that the indicator stem is engaged against the keyway on the conditioner drive shaft. Check the backlash between the conditioner drive gear and each pinion separately; while holding the lower output shaft securely against rotation, rotate the conditioner drive shaft back and forth to measure the backlash between the gears. Repeat the process by holding the input shaft, and recheck the backlash; it should be a similar amount. The proper backlash reading at the conditioner drive shaft keyway is 0.002" to 0.004"; this indicates a true backlash of 0.008" to 0.018" between the gears.

Remove the conditioner drive shaft bearing cap and shaft assemblies from the gearbox, and inspect the gear contact pattern on the pinion gears; the pattern should be 40% central-toe.



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Backlash Adjustment

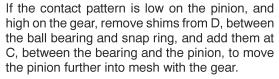
14. If the backlash was found to be incorrect, or if the contact pattern is not located properly on one or both pinions, the gearbox will need to be reshimmed. To adjust backlash, move shims from one end of the conditioner drive shaft to the other. To increase backlash, move shims from A, between the snap ring and bearing cone in the bearing cap, to B, between the ball bearing and snap ring in the housing. To decrease backlash, move shims from B, and install them at A.

The shims used in the gearbox are available in 0.012", 0.016" and 0.020" thicknesses; shifting the conditioner drive shaft 0.004" will change the backlash between the gears approximately 0.0027". To shift the shaft 0.004" inwards (to decrease backlash), remove a 0.020" or 0.016" shim at B and position it at A, and move the next size smaller shim (0.016" or 0.012") from A to position B.

Gear Contact Pattern

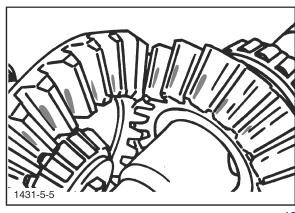
To adjust the gear contact pattern, move shims from one end of the appropriate shaft to the other, to reposition the pinion gear.

If the contact pattern is high (towards the top of the tooth) on the pinion, and low (towards the root of the tooth) on the gear, remove shims from C, between the bearing and pinion, and add them at D, between the ball bearing and the snap ring, to move the pinion out of mesh with the gear.

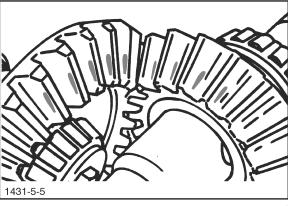


The shims used on the input and lower output shafts are the same on both ends, and are available in 0.012", 0.016" and 0.020" thicknesses. To shift the pinion 0.004" inwards (to increase mesh), remove a 0.020" or 0.016" shim at D and position it at C, and move the next size smaller shim (0.016" or 0.012") from C to position D. Use the opposite of this process to move the pinion out of mesh.

Repeat steps 11 through 14 as necessary until the back lash and gear contact patterns are correct.



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- 15. Remove the conditioner drive shaft bearing cap,
 - 1, from the gearbox, and install a new shaft seal,
 - 2, in bearing cap, flush with the outer surface. Lubricate the seal lip liberally with grease.

NOTE: Gearbox seals are special high temperature seals; do not substitute with "jobber" seals.

Apply a thin bead of silicone sealant around the inner flange of the bearing cap, and carefully lower the cap over the conditioner drive shaft, use caution not to roll or damage the seal lip. Orient the check plug, 3, so that it is 90° counterclockwise from the fill plug, 4, and install the eight cap screws to retain the bearing cap; torque the cap screws to 51 - 62 N·m (38 - 46 ft.-lbs.).

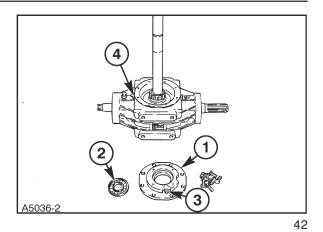
16. Install the dust plate, 1, over the input shaft, and secure using the snap ring, 2.

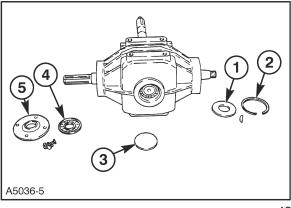
Drive a new plug, 3, into the rear of the housing until it is flush with the outer surface.

Install the lower output shaft seal, 4, into the housing using a seal driver until the seal is flush with the face of the housing. Install the cover, 5, and tighten the four cap screws evenly to push the seal into the housing the remaining distance. Torque the cap screws to 28 - 30 N·m (21 - 23 ft.-lbs.).

Fill the gearbox with fresh oil; the gearbox holds approximately 2000 ml (68 oz.) of oil. Use only API GL5 80W90 gear oil.

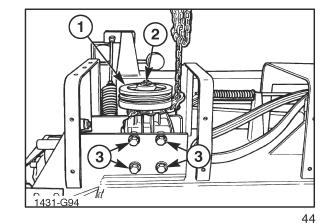
NOTE: Gearbox seals are special high temperature seals; do not substitute with "jobber" seals.



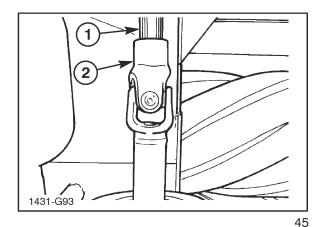


RIGHT-HAND GEARBOX - INSTALLATION

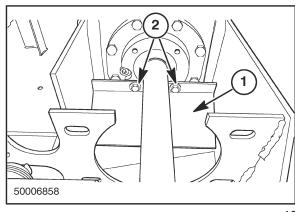
 Install a woodruff key in the keyway of the input shaft, and apply a permanent lubricant to the shaft and key. Slide the drive sheave, 1, over the shaft, and secure with the washer and castellated nut, 2. Using a hoist and lifting sling, lower the right-hand gearbox into the frame, tipping the conditioner drive shaft through the opening in the header frame.



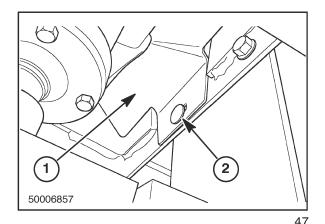
2. Line up the splines on the lower output shaft, 1, with the splines on the cutter bar drive shaft, 2, as the gearbox is lowered into the frame. Secure the right-hand gearbox to the main frame using eight 5/8" x 1-1/4" cap screws and lock washers, 3, Figure 44. Torque the gearbox retaining bolts to 224 N·m (165 ft lbs). Remove the lifting sling and hoist.



3. Attach the outer gearbox shroud, 1, by turning in cap screws, 2.

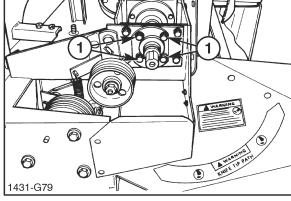


4. Attach the inner gearbox shroud, 1, using a carriage bolt and nut, 2.



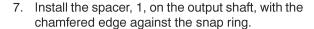
5. Install the right side support bearing and flangettes using four $1/2'' \times 1-1/4''$ cap screws, 1. Tighten the bolts evenly to 113 N·m (83 ft.-lbs.).

NOTE: Do not tighten bearing flangette bolts until gearbox mounting bolts are tightened.

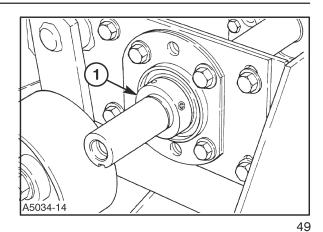


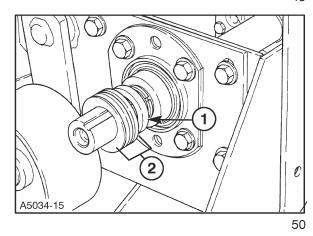
 Slide the lock collar, 1, over the shaft and onto the right side bearing flange. Use a hammer and punch to tighten the lock collar in the direction of rotation (counterclockwise, as viewed from the end of the shaft).

Install the snap ring onto the shaft by positioning the flat face of the spacer against the snap ring. Use a $5/8" \times 1-1/2"$ cap screw and flat washer threaded into the shaft to push the snap ring onto the shaft. Use a screwdriver or punch to slide the snap ring into the groove on the output shaft.

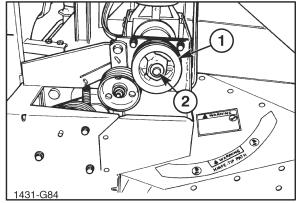


NOTE: Make certain that the chamfer on the spacer is against the snap ring to prevent the snap ring from being pushed out of its groove.



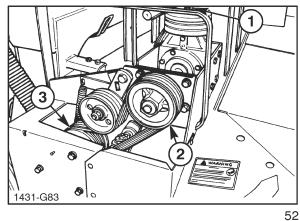


8. Install any shim washers, 2, Figure 50, removed at disassembly on the shaft. Place the square key in the keyway on the shaft and install the conditioner roll drive pulley, 1, on the output shaft. Install the 5/8" x 1-3/4" center bolt, 2, and washer to retain the sheave. Position wood blocking between the cutter bar discs, or insert a bar in the right end tower to lock up the driveline. Torque the bolt to 224 N·m (165 ft.-lbs.).

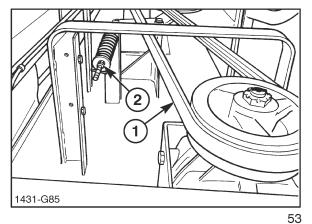


9. With the blocking still in place, torque the castellated nut, 1, retaining the drive sheave to 224 N·m (150 ft.-lbs.).

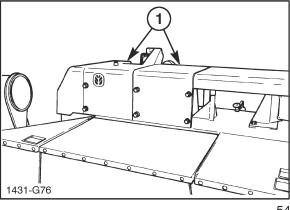
Install the conditioner drive belt over the gearbox sheaves, and adjust the idler spring length to 279 mm (11"). Check the alignment of the drive pulley, 2 and the driven pulley, 3. If the pulleys are not in alignment add or remove shim washers as needed behind the drive pulley, 2.



10. Install the right side header drive belt, 1, on the drive sheave. Tighten the adjusting nut, 2, on the spring tension rod until the spring length matches the length of the gauge. Tighten the jam nut to secure.



11. Reinstall the right side shielding, 1, on the unit; position the end and center shields under the right middle shield. Install all hardware loosely to ensure a proper fitup before tightening retaining bolts.



SECTION 31 - IMPLEMENT POWER TAKE-OFF (PTO)

Chapter 4 - Step-up Gearbox

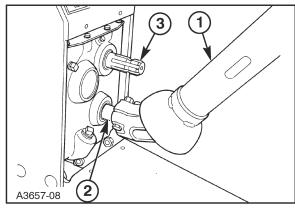
CONTENTS

Section	Description	Page
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	Repair Time Schedule	31-12

The units are shipped from the factory with the PTO driveline configured for 540 PTO operation. In this mode, the 540 RPM primary PTO shaft, 1, connects to the 21 spline gearbox shaft, 2, and power flows through the gearbox to step up the output to the secondary PTO shaft to 1000 RPM.

The output shaft of the gearbox also extends out the front of the gearbox. For 1000 RPM PTO operation, the 1000 RPM PTO primary shaft connects to the 6 spline end of the output shaft, 3, to provide a direct drive to the secondary driveline.

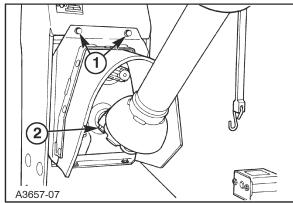
IMPORTANT: The gearbox must be removed and inverted for 1000 RPM operation to properly align the PTO shaft with the tractor, and to prevent the PTO shaft from pulling apart over rolling terrain.



1

To Convert Step-up Gearbox for Different PTO Speed:

1. Remove front PTO shield by removing two cap screws and cupped lock washers at 1. Remove the existing primary shaft from the gearbox by removing the cap screw and locknut at 2.

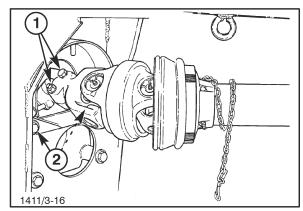


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- Squeeze the sides of the rear PTO shield together until they slide off retaining pins; pull the shield firmly downwards off upper retaining pin to remove it.
- 3. Remove the two cap screws, 1, and locknuts clamping the secondary PTO shaft to the gearbox output shaft, and slide the PTO shaft off.

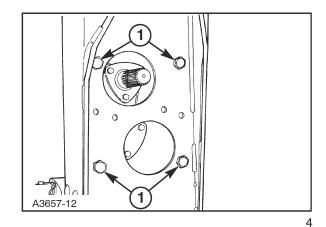
IMPORTANT: The secondary PTO shaft is very heavy and awkward; use caution not to drop the shaft assembly as personal injury or damage to the CV joint may result.

 Remove the rear PTO shield mount by removing two cap screws, flat washers, cupped lock washers and nuts at 2.

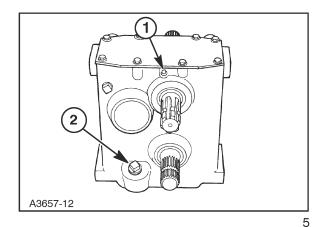


5. Remove the four cap screws and flat washers at 1, which attach the gearbox to the tongue. Tip gearbox forward, and remove it from the tongue.

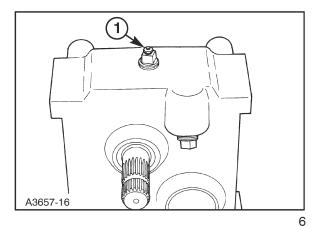
IMPORTANT: The step-up gearbox is heavy and awkward; use caution not to drop the gearbox as personal injury or damage to the gearbox may result.



6. For 540 RPM Operation: Remove the breather, 1, Figure 6, from the plug on the top of the gearbox. Lay box on its side, and remove the 1/8" pipe plug, 2, from below the output shaft bearing bore. Reinstall the breather into the bearing bore hole, and the 1/8" pipe plug into the drain plug.



For 1000 RPM Operation: Remove the breather, 1, Figure 5, from above the output shaft. Lay box on its side, and remove the 1/8" pipe plug, 1, from the center of the drain plug. Reinstall the breather into the drain plug, and the 1/8" pipe plug into the breather hole.



7. Tip the step-up gearbox so that the breather is positioned upwards and lift it back into the tongue; for 1000 RPM operation, it will be necessary to install top of gearbox first, and then swing bottom of gearbox into frame to avoid damaging breather.

IMPORTANT: The step-up gearbox is heavy and awkward; use caution not to drop the gearbox as personal injury or damage to the gearbox may result.

- 8. Install the 4 retaining bolts at 1, and torque to 224 N·m (165 ft. lbs.).
- 9. Reinstall the rear PTO shield mount at 2, using the previously removed hardware. Select the appropriate mounting holes on the tongue to position the shield mount around the output shaft location.
- 10. Remove any shaft protectant from the gearbox splines, and apply a thin coat of grease to the splines. Install the appropriate primary PTO shaft, 1, to bottom shaft of gearbox. Install cap screw, 2, and locknut; torque to 87 N·m (64 ft. lbs.).

IMPORTANT: The PTO shafts are very heavy and awkward; use caution not to drop the shaft assemblies as personal injury or damage to the CV joints may result.

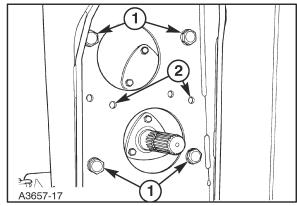
NOTE: Do not overtorque; locknuts are Class C, and are limited to 87 N m (64 ft. lbs.).

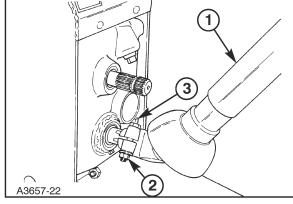
- 11. Check for proper gearbox oil level at 3, and top off with API GL5 80W90 gear oil if necessary. Reinstall the front PTO shield using 4 bolts.
- 12. Slide the rear PTO shield over the secondary PTO shaft. Install the secondary PTO shaft, 1, by sliding the voke end onto the output shaft of the step-up gearbox. Install two cap screws, 2, and locknuts; torque to 64 ft. lbs. (87 N·m).

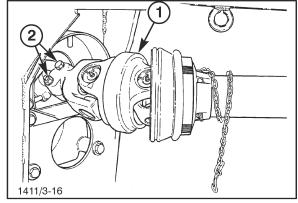
NOTE: Do not overtorque; locknuts are Class C, and are limited to 87 N m (64 ft. lbs.).

IMPORTANT: The secondary PTO shaft is very heavy and awkward; use caution not to drop the shaft assembly as personal injury or damage to the CV joint may result.

13. Reinstall the rear shield onto the retaining pins.



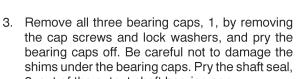


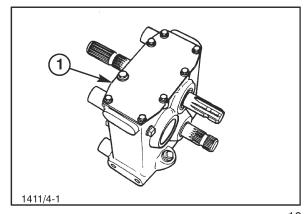


Step-up Gearbox - Disassembly

Remove the gearbox from the tongue, following the steps described in previous section; "To Convert Step-Up Gearbox for Different PTO Speed".

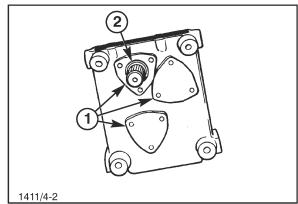
- 1. Drain the oil from the gearbox.
- 2. Remove the cover plate, 1, from the gearbox by removing eight cap screws and lock washers. Pry the cover off of the gearbox, and clean off any silicone sealant residue.





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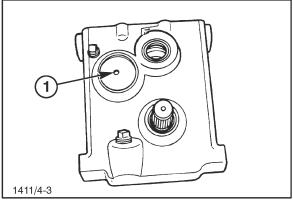
2, out of the output shaft bearing cap.



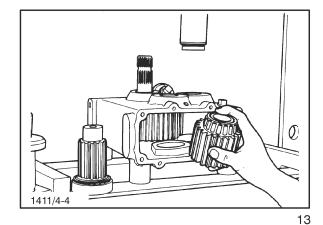
11

4. Drill a 10 mm (3/8") hole, 1, in the center of the expansion plug, taking care not to damage the shaft behind the plug. Pry the plug out of its retaining groove in the gearbox with a punch or screwdriver.

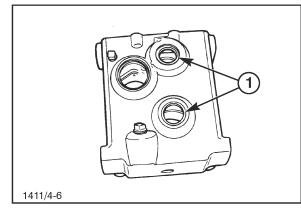
NOTE: The intermediate shaft has a 3/8" threaded hole in it; use caution not to damage the threads while drilling the hole in the plug, or when prying plug out of the bore.

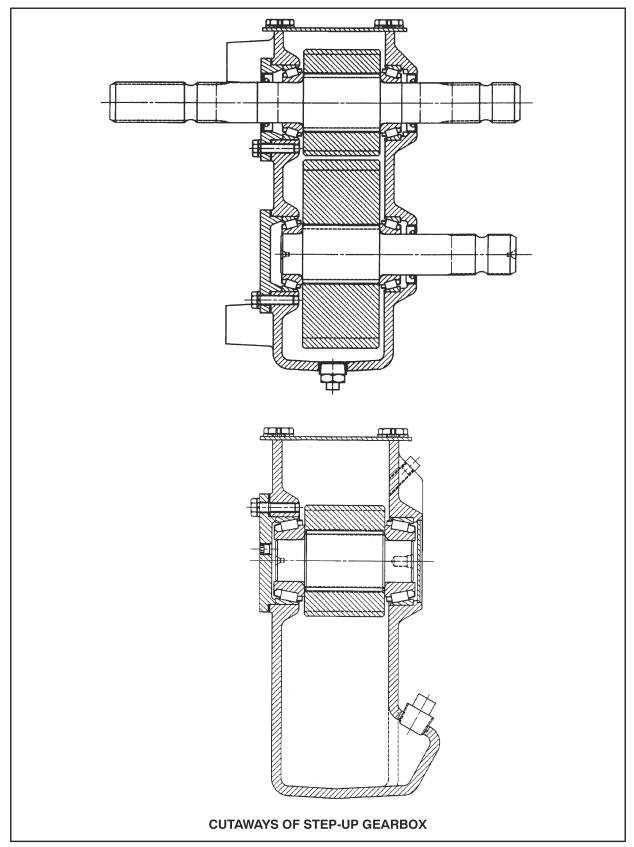


5. Position the gearbox in a press with the back side of the gearbox facing down, and push the shafts out of the gearbox, starting with the output shaft. The shafts must be pushed out of the upper bearings only, as the shafts are a slip fit in the gears. As the shafts are pushed out of the upper bearing, the lower bearing cup and shaft will drop out of the gearbox suddenly; use caution to prevent damage to these components. Remove the gears out of the open end of the gearbox as each shaft is removed.



- 6. Pry the input and output shaft seals, 1, out of the gearbox housing. Drive the three remaining bearing cups out of the gearbox housing. Use a split bearing clamp to capture the bearing cones on the shafts, and press the shafts out of the bearings.
- 7. Clean and degrease all sealing surfaces on gearbox housing, cover plate and bearing caps.





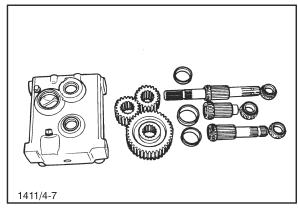
Step-up Gearbox - Assembly

Clean and inspect all parts. Inspect shafts for excessive wear or damage to splined surfaces, and for damage on bearing shoulders. Check gear teeth for chipping or cracks, and the mating splines for wear. Replace any damaged parts.

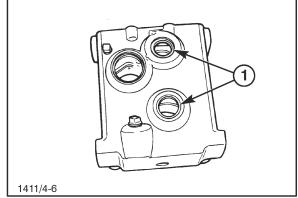
Replace bearings if any pitting or brinelling of bearing cup or cone is noticed. Replace both bearing cup and cone if damage is found; do not intermix old and new bearing components.

Always install new shaft seals when rebuilding the step-up gearbox.

1. Drive the two shaft seals, 1, in flush with the front of the gearbox housing, and apply grease to the seal lips.



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Install three new bearing cups into the front side of the gearbox housing, seating them securely against the shoulders in the housing. Apply oil to the new bearing cones, and press them onto the rear end of each shaft as indicated:

Input shaft, 1

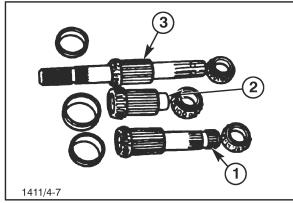
- short, non-splined end

Intermediate shaft, 2

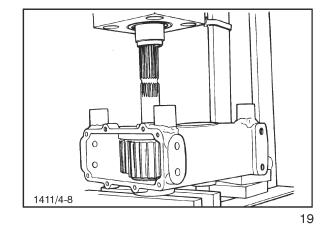
- end opposite threaded hole

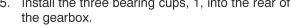
Output shaft, 3

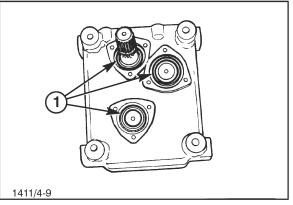
- long end with 21 spline shank



- 2. Position the gearbox housing in a press with the front of the gearbox facing down. Apply oil to the bearing cone, and install it into the bearing cup in the housing. Place the 39T drive gear into the housing over the bearing and insert the input shaft through the gear and bearing cone. Press the input shaft as required to fully seat bearing cone against the shoulder on the shaft.
- 3. Apply oil to the new intermediate shaft bearing cone, and install it into the bearing cup in the housing; place a 21T gear over bearing. Insert the intermediate shaft down through the gear until end of shaft is started into bearing cone. Press the shaft to seat bearing cone against the shoulder on shaft.
- 4. Apply oil to the new output shaft bearing cone, and install it into the bearing cup in the housing; place the remaining 21T gear over the bearing. Insert the 6 spline end of the output shaft down through the gear and bearing cone. Press the output shaft as required to seat the bearing cone against the shoulder on shaft.
- 5. Install the three bearing cups, 1, into the rear of

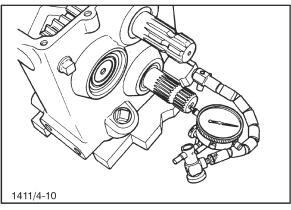




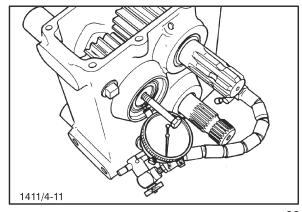


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6. Install the input shaft bearing cap and original shim pack using three cap screws and lock washers. If the original shim pack is destroyed, or if all new parts are being used, use a starting shim pack thickness of 1.02 - 1.27 mm (0.040" -0.050"). Install a dial indicator and measure input shaft end play. Install shims as required to adjust the end play of shaft between 0.025 - 0.076 mm (0.001" - 0.003").

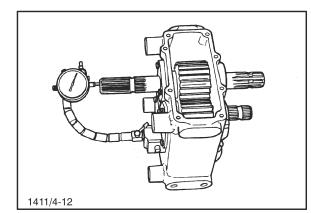


7. Install the intermediate shaft bearing cap and original shim pack using three cap screws and lock washers. If the original shim pack is destroyed, or if all new parts are being used, use a starting shim pack thickness of 1.02 - 1.27 mm (0.040" - 0.050"). The dial indicator may be positioned to read off the rear of the shaft, by removing the plug in the bearing cap, and installing the indicator probe through the hole, or positioned on the front of the shaft as shown. Thread a 3/8" T-handle or bolt into the front end of the intermediate shaft, and use it to move the shaft to check for end play. Install shims as required to adjust end play of intermediate shaft between 0.025 - 0.076 mm (0.001" - 0.003").



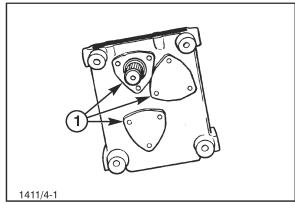
22

8. Drive a shaft seal into the output shaft bearing cap until it is flush with the face of the cap, and apply grease to the seal lip. Install the bearing cap and the original shim pack using three cap screws and lock washers. If the original shim pack is destroyed, or if all new parts are being used, use a starting shim pack thickness of 1.02 - 1.27 mm (0.040" - 0.050"). Install a dial indicator and measure the shaft end play. Install shims as required to adjust end play of the shaft between 0.025 - 0.076 mm (0.001" - 0.003").



23

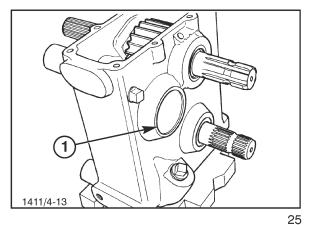
9. After the end play is adjusted on all three shafts, remove the bearing caps, 1, apply a thin coat of silicone sealant to the pilot surface of the bearing caps and reinstall the caps. Apply silicone sealant to the ends of the cap screws before reinstalling them.



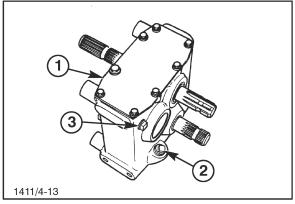
10. Apply a thin coat of silicone sealant to the edge of the expansion plug, 1, and insert it into the bore of the intermediate shaft until it contacts the shoulder. The plug must then be hammered in place to seat the edges of the plug into a recess in the bore. Hammer over the full surface of the plug, starting in the center and working outwardly in a circular pattern until the outer face of the plug is flush with, or slightly recessed past the face of the bore.

NOTE: Do not drive plug in too far, as it may contact the end of the shaft.

- 11. Apply a bead of silicone sealant on the housing and install the cover plate, 1.
- 12. Reinstall the gearbox in the tongue, following the steps described in previous section; "To Convert Step-Up Gearbox for Different PTO Speed". Fill the gearbox with API GL-5 80W-90 gear oil to the level of the check plug, 2, (540 RPM position), or 3, (1000 RPM position). The gearbox holds 650 ml (22 oz.) of gear oil.

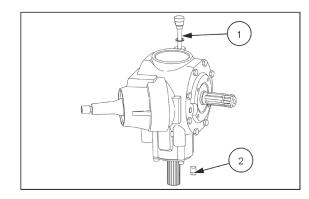


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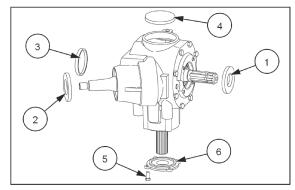


Product feeding - Header drive system - Bevel gearbox - Disassemble

- Prior to disassembly, drain the oil from the bevel gearbox, as follows:
 - A. Prepare a method for capturing and disposal of the drain oil from the gearbox.
 - B. Remove the combination breather/dipstick (1) from the gearbox to prevent damage during disassembly.
 - C. Remove the oil drain plug (2).
 - D. Capture and completely drain the oil from both gearboxes.
 - E. Dispose of the captured oil in accordance with shop practice and/or local oil recycling requirements.
- 2. Remove the oil seals (1) and (2) from the input shaft and the upper output shaft.
- 3. Remove the caps (3) and (4).
- 4. Remove the four bolts (5) that secure the lower output shaft cover (6) to the gearbox.
- 5. Remove the cover.

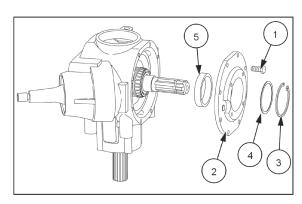


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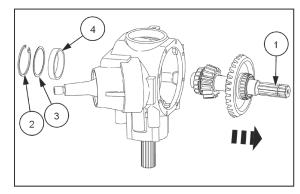
NHIL14HT00281AA

- 6. Remove the eight bolts (1) that secure the input shaft cover cover (2) to the gearbox.
- 7. Remove the snap ring (3) and the shim (4).
- 8. Remove the bearing cup (5).



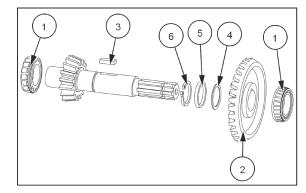
NHIL14HT00282AA

- 9. Use a brass hammer to drive the input shaft (1) out in the indicated direction.
- 10. Remove the snap ring (2) and the shim (3).
- Remove the bearing cup (4) from the gearbox housing.



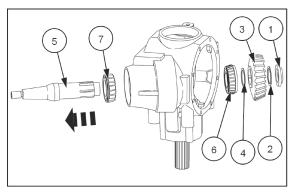
NHIL14HT00283AA

- Use a bearing puller to remove the bearing cones (1) from the input shaft.
- 13. Remove the bevel gear (2).
- 14. Remove the key (3) from the key seat in the shaft.
- 15. Remove the shim (4).
- 16. Remove the spacer (5).
- 17. Remove the snap ring (6).



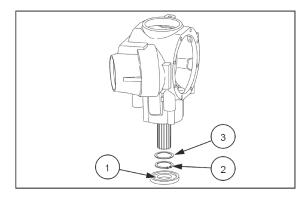
NHIL14HT00284AA

- 18. Remove the locknut (1) from the upper output shaft.
- 19. Remove the shim (2).
- 20. Remove the pinion gear (3).
- 21. Remove the shim (4).
- 22. Use a brass hammer to drive the upper output shaft (5) out in the indicated direction in order to extract it from the housing.
- 23. Retrieve the bearing cone (6) from inside of the gearbox housing.
- Use a bearing puller to remove the bearing cone (7) from the upper output shaft.



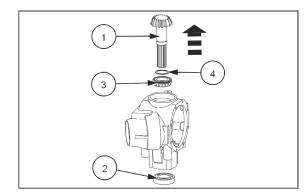
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- 25. Remove the oil seal (1) from the lower output shaft.
- 26. Remove the snap ring (2).
- 27. Remove the shim (3).



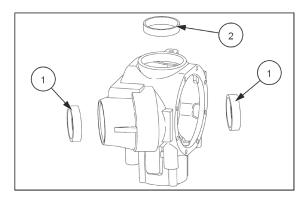
NHIL14HT00287AA 7

- 28. Use a brass hammer to drive the lower output shaft (1) out of the housing in the indicated direction.
- 29. Use a bearing puller to remove the bearing (2).
- 30. Use a bearing puller to remove the bearing cones (3) from the lower output shaft.
- 31. Remove the shim (4).



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32. Remove the bearing cups (1) and (2) from the gearbox housing.

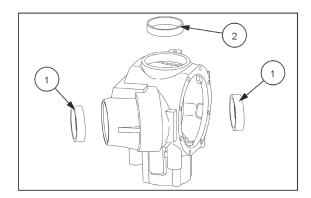


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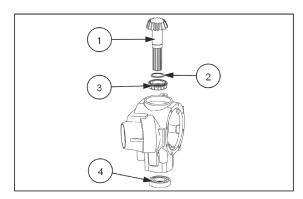
Product feeding - Header drive system - Bevel gearbox - Assemble

1. Insert the bearing cups (1) and (2) into the housing.



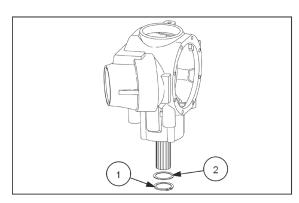
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- 2. Install the shim (2) and the bearing cone (3) onto the pinion shaft (1).
- 3. Install the shaft assembly into the housing.
- 4. Install the bearing cone (4) onto the shaft.



NHIL14HT00286AA 2

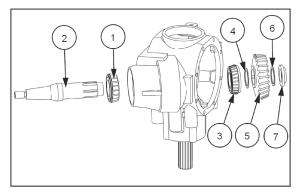
- 5. Install the snap ring (1).
- 6. Use an inch-pound rated torque wrench to check the bearing preload and record the value.
- 7. Hit the shaft from both sides with a brass hammer to set the shaft place.
- 8. Check the shaft preload again with a torque wrench. The difference between the two values must be 1.2 4.5 kg·cm (1.04 3.91 lb·in). If the value is not correct, change the number of shims (2).



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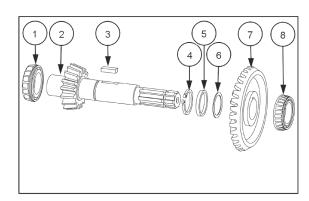
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- 9. Install the bearing cone (1) onto the shaft (2).
- 10. Install the shaft assembly into the gearbox housing.
- 11. Install the bearing cone (3) onto the shaft.
- 12. Install the shim (4) onto the shaft.
- 13. Install the gear (5) onto the shaft.
- 14. Install the shim (6) onto the shaft.
- 15. Apply Loctite® 270 thread-locking sealant to the locknut threads (7) .
- 16. Torque the locknut to a minimum of 10 kg·cm (8.68 lb·in) .
- 17. Hit the shaft from both sides (2) with a brass hammer to set the shaft place.
- Use an inch-pound rated torque wrench to check the bearing preload.
 - If the value is not between 6 10 kg·cm (5.21 8.68 lb·in), tighten or loosen the locknut until the bearing preload is within the specification.



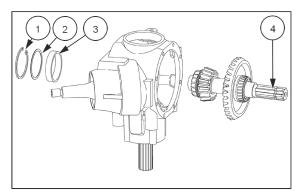
NHIL14HT00285AA

- 19. Install the bearing cone (1) onto the shaft (2) .
- 20. Install the snap ring (4).
- 21. Install the spacer (5).
- 22. Install a shim (6).
- 23. Install the square key (3) into the key seat in the shaft.
- 24. Install the bevel gear (7) onto the shaft.
- 25. Install the bearing cone (8).



NHIL14HT00284AA

- 26. Install the bearing cup (3) into the housing.
- 27. Install a shim (2).
- 28. Install a snap ring (1).
- 29. Install the shaft assembly (4) .

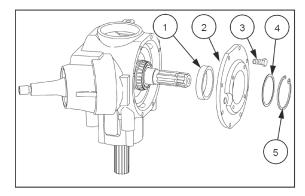


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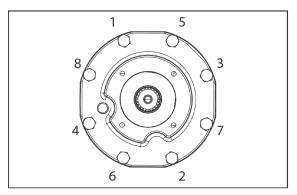
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30. Press the bearing cup (1) into the inside of the cover (2) .

- 31. Install the cover (2) with eight bolts (3). Snug the bolts following the 8-bolt tightening pattern without applying a final torque.
- 32. Install a shim (4) over the shaft and against the bear-
- 33. Install the snap ring (5) to secure the shim.
- 34. Use an inch-pound rated torque wrench to check the bearing preload.
- 35. Remove the snap ring (5).
- 36. Hit the shaft from both sides with a brass hammer to set the shaft place.
- 37. Check the shaft preload again with a torque wrench.
 - If the value is not between 6 10 kg·cm (5.21 - 8.68 lb·in) , tighten or loosen the locknut until the proper value is achieved.
 - The difference between the two values must be 5 - 9 kg·cm (4.34 - 7.81 lb·in).
 - If the value is not within this range, change the number of shims. If the number of shims is changed, the preload will also need to be reset.

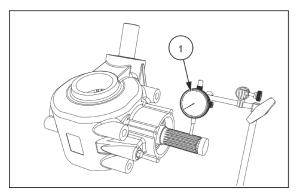


NHIL14HT00282AA



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- 38. Check the backlash between the bevel gear and the splined output shaft gear.
 - Install a dial indicator (1) on the splined output shaft and zero it out.
 - Hold the splined output shaft steady and turn the В. splined input shaft.
 - The measured backlash should be 0.16 0.42 mm (0.006 - 0.017 in) . Adjust the shims (2) (Figures 2 and 4) or the shim (4) (Figure 7) to achieve the specification.



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- 39. Check the backlash between the splined input shaft gear and the keyed output shaft gear.
 - Install a dial indicator (1) on the splined input shaft and zero it out.
 - Hold the splined output shaft steady and turn the splined input shaft back and forth.
 - The measured backlash should be 0.15 0.40 mm (0.006 - 0.016 in) . Adjust the shims (4) and (6) (Figures 4), the shim (2) (Figure 6), or the shim (4) (Figure 7) to achieve the specification.

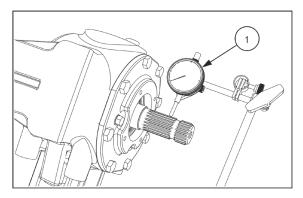
NOTE: If you changed the shim positions to correct the backlash setting, you must set the bearing preload again.

40. Apply Permatex® Non-drying Prussian Blue gear marking compound to the teeth of both sets of gears, and then check the gear tooth contact pattern (1).

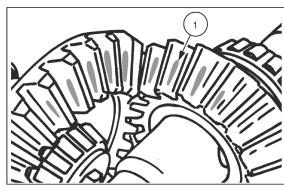
NOTE: Figure **11** is for reference only.

The gear tooth contact pattern should be centered on each tooth and there should be clearance between the contact pattern and the top of the tooth.

See Gearbox - Shimming - Gear tooth contact pattern for more information.

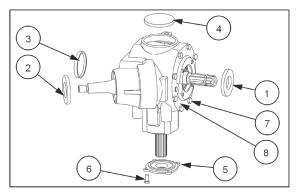


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NHIL16HT00830AA

- 41. Remove the eight bolts (7) that secure the cover (8) , and then remove the cover.
- 42. Apply a thin bead of Loctite® SI 598™ Black sealant or Dow Corning® 7091 Adhesive Sealant Black sealant between the gearbox housing and the cover.
- 43. Install the cover and the bolts.
 - Torque the bolts to 49 62.8 N·m (36.1 -46.3 lb ft).
- 44. Install the oil seals (1) and (2).
- 45. Install the caps (3) and (4).
- 46. Install the cover (5) and the four bolts (6).
 - Torque the bolts to 24.5 31.4 N·m (18.1 -23.2 lb ft).

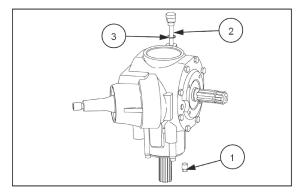


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Discbine® 313 103325288

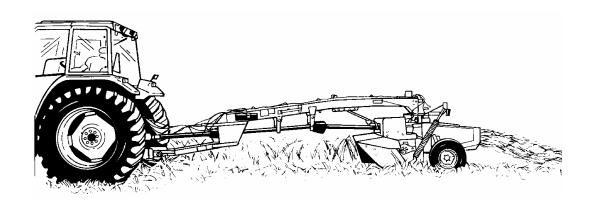
47. Apply Loctite® SI 598™ Black sealant or Dow Corning® 7091 Adhesive Sealant Black to the threads of the drain plug (1), and install the drain plug into the housing.

- Torque the drain plug to 29.4 N·m (21.7 lb ft) .
- 48. Fill the gearbox with 800 mL (27 US fl oz) of Tutela Hypoide EP Gear lube SAE 80W-90 or CNH HYPOIDE SSL SYNTHETIC GEAR LUBE 75W-90 (synthetic).
- 49. Install the breather plug/dipstick (2) and washer (3), and then confirm the proper oil fill level with dipstick.



NHIL14HT00280AA

Disc and Sickle Mower Conditioners Technical Training



Disc Cutterbar Maintenance

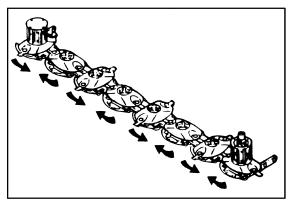
Notes

INTRODUCTION

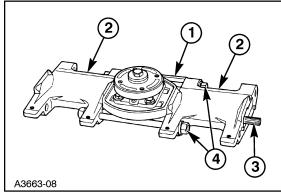
The disc mower-conditioners use an 8-disc, counter-rotating disc cutter bar to provide a 10' 4" cutting width. (NH model H7230-H7330, CIH DC102)

All eight discs are counter-rotating. The outer two discs are each equipped with an open feed drum to help feed crop into the conditioner rolls. The cutter bar is driven at one end through a drive shaft connected to the #1 disc (numbered from left to right, as viewed from the rear).

The disc cutter bar is based on a true modular design. Gearbox modules, 1, are connected by independent, hardened alloy steel drive shafts, 3, running through spacer modules, 2, and the entire cutter bar is assembled using high strength tie bolts, 4, to clamp the disc modules between the spacers. In the unlikely event of catastrophic failure, damage is contained to one module, which can be easily replaced without disturbing other modules.



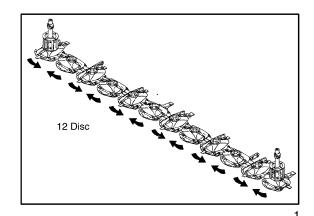
1



INTRODUCTION

CUTTER BAR

The 2355 disc auger header has a 12-disc cutter bar to provide a 15′ 4″ cutting width. The **NH 770HD**, **CIH RD182** disc auger header has a 14-disc cutter bar to provide 18′ of cutting width. The modular disc cutters all counter-rotate with respect to the adjacent discs. The whole bar is driven from the end discs by hydraulic motors con-nected to the discs with drive shafts and U-joints. The two end discs drive the others through connecting shafts passing through the disc modules and spacers. The end discs are equipped with open feed drums to help feed crop into the auger.

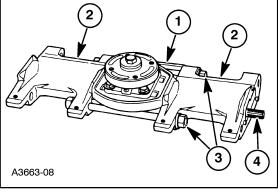


14 Disc

50032284

2

Each disc module, 1, is separated from the others by a spacer module, 2, and the assembly is held together by high-strength tie bolts, 3. The drive shaft, 4, passes through the spacer assembly to engage the adjacent disc. The modular design of the cutter bar allows any damaged disc module to be replaced easily.



SECTION 58 - ATTACHMENTS/HEADERS

Chapter 1 - Cutter Bar

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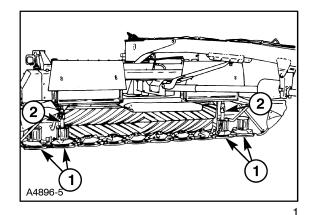
SPECIAL TOOLS

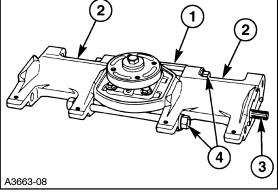
Tool Number	Description/Use
FNH23ET95	Top cap bearing cover
FNH01221-2	Cutter bar tie bolt holding tool
FNH01221-3	Cutter bar wrench

INTRODUCTION

The Models **NH H7450 H7550, Discbine®** and **CIH DC13** disc mower-conditioners use a 10 disc cutter bar to provide a 13' cutting width. Discs #2 through #9 (numbered from left to right, as viewed from the rear) counter-rotate, while the outer two discs, 1, on each end of the cutter bar corotate (both spin in the same direction), and are each equipped with an open feed drum to help feed crop into the conditioner. The cutter bar is driven from both ends through drive shafts, 2, connected to the #2 & #9 discs.

The disc cutter bar is New Holland designed and produced, and is a true modular design. Gearbox modules, 1, are connected by independent, hardened alloy steel drive shafts, 3, running through spacer modules, 2, and the entire cutter bar is assembled using high strength tie bolts, 4, to clamp the disc modules between the spacers. In the unlikely event of catastrophic failure, damage is contained to one module, which can be easily replaced without disturbing other modules.





Each disc module is a separate gear case with its own oil sump, and utilizes precision forged gears for strength. Each module consists of a top cap assembly and a lower module assembly.

The top cap assembly consists of the top cap housing, a bevel gear shaft, a matched bearing set and a disc hub. The top cap assembly can be removed from the module for servicing, without disassembling the cutter bar.

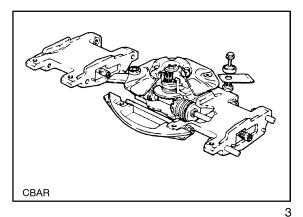
The lower module assembly consists of the lower module housing and the pinion shaft and bearing assembly. Because the pinion shaft runs at 5400 RPM, steel slingers are mounted at each end to splash oil on the shaft seals for lubrication and cooling.

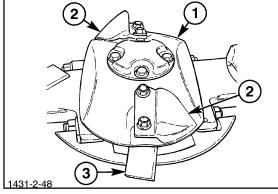
The direction of rotation of the disc module is determined by the installation of the pinion shaft; if the pinion shaft is installed with the gear positioned on the right side of the housing, the disc will rotate clockwise. Installing the pinion shaft with the gear to the left will rotate the disc counterclockwise.

If a problem is found with a specific module, the extent of the damage can be quickly determined by removing the disc and the top cap assembly of the affected module. If damage is limited to the top cap assembly components, the lower module can be flushed out to remove contaminants, and a new top cap assembly installed to complete the repair.

The cutter bar uses small diameter, high profile discs, 1, which are 4.7 mm (3/16") thick and hardened for long wear. The profile of the discs, combined with bolt-on lifters (1431 only), 2, provides aggressive feeding to the conditioner in difficult crop conditions.

The discs are equipped with 50.8 mm (2") wide knives, 3, which are retained with 1/2" bolts and hardened knife nuts. The knives are reversible for long life, and always have the beveled edge up. An arrow is stamped on both sides of the knife to show the direction of rotation. The knives can be easily changed in any position on the cutter bar.





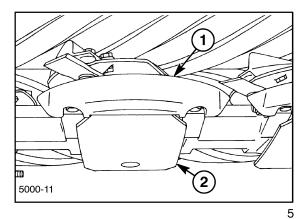
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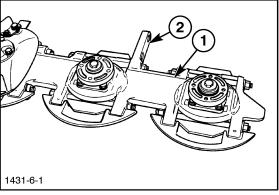
Each disc module is protected by a ductile iron rock guard, 1, and a skid shoe, 2.

Skid shoes are 6.4 mm (1/4") thick and 203 mm (8") wide; they extend behind the module several inches for optimum flotation and extended wear life of the shoe.

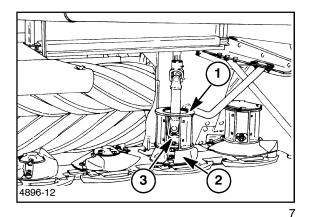
All cutter bar components are interchangeable between the 600 Series disc mowers, 1411, 1412, 1431, 1432, and 2355 Discbine[®] disc mower-conditioners, with two exceptions. The 615 and 617 disc mowers, because of the odd number of discs and the need for the end discs to be spinning inwards, have the #1 and #2 discs co-rotating; that is, they both spin in the same direction. This requires a slightly longer spacer and drive shaft between the #1 and #2 disc modules to eliminate interference between the knives on these two discs.

The 1431 and 1432 use a longer drive shaft between the two end discs on each end of the cutter bar, which also co-rotate, and use a special spacer, 1, which is longer to accommodate the longer drive shaft. These longer spacers contain the bayonet arms, 2, for mounting the cutter bar to the header.

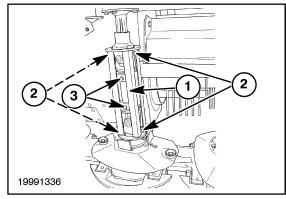




The Model 1431 disc mower-conditioners, serial number 638668 and below, utilizes a large diameter drum, 1, around each drive shaft. The drum is mounted to the cutter bar drive module between the disc, 2, and drive shaft flange, 3. To remove the drum, the drive shaft must be unbolted from the drive module.



Model 1431, serial number 638669 and above, and Model 1432 disc mower-conditioners use a smaller diameter drum, 1, around each drive shaft. The two halves of the drive are bolted together at 2, and to the drive shaft at 3. The drum can be removed from the drive shaft without removing the shaft from the drive module.



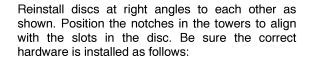
4896-11

DISCS

Each time knives are replaced or turned, check the discs for damage and wear. If a disc is bent or cracked, replace it. When the leading edge, 1, of the disc wears thin, it can be used on an opposite rotating module to utilize the second face.

IMPORTANT: Do not make weld repairs to the discs, as this will affect disc strength and balance.

Remove discs by removing four bolts at 2.



Discs w/caps 1/2 x 1" cap screws

cupped lock washers

End discs & towers 1/2 x 1-1/4" cap screws

thick hardened washers

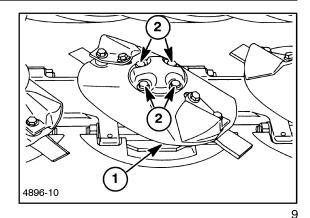
#2 & #9 discs, 1/2 x 1-3/4" cap screws towers & thick hardened washers

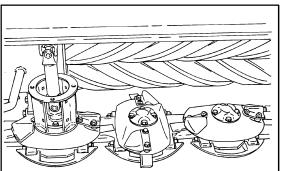
drive shafts

IMPORTANT: Use of incorrect disc retaining hardware may cause cutter bar lock-up and potential damage, or may prevent proper retention of discs.

Torque retaining bolts to 113 N·m (83 ft.-lbs.).

NOTE: Do not over-tighten as bolts may yield.





KNIFE AND BOLT INSPECTION

Inspect the cutter bar daily for damaged components. The quality of cut and safety of operation depends on regular inspection of the cutter bar. Check the discs, knives, and hardware systematically for wear, damage or loose components.

Operating over rough terrain and rocky conditions can cause the knives to crack or deform leading to cutting problems, increase of safety risks, and possible cutter bar damage.

NOTE: Striking an object can cause knife hardware to loosen. If an obstacle is struck, STOP, check all hardware and retighten.

The knives must be replaced or turned over to a new cutting edge on a timely basis to maintain good cutting performance. Dull knives will require more horsepower to cut the crop and will leave a ragged stubble.

Replace the knives if they are bent, severely worn, or if the hole is elongated. Replace the knife bolt if wear is found or the nut can be installed by hand.

Replace the knife nut if the shoulder or threads show wear.

NOTE: The knife bolts have a lock patch on them. If the knife nuts can be installed by hand, replace the bolt.

When a knife or securing hardware is in question, replace it.

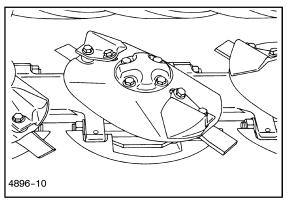


🛕 Warning 🛕

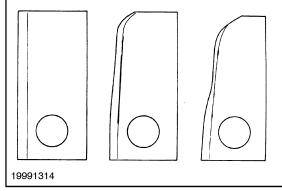


Replace cracked or severely deformed knives immediately to prevent an accident.

If the cutter bar cannot be turned by hand due to crop buildup under the discs, start the tractor and operate the PTO at 1/3 rated speed for 30 seconds. Shut the tractor off and recheck. If the cutter bar still cannot be turned by hand, it will be necessary to remove the discs and clean out the material build-up.



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DISC KNIVES

New Holland has several disc mower and disc mower-conditioner knives available through Service Parts. Each type of knife is designed to function well in specific crop and field conditions. Contact your New Holland Dealer for the disc mower/mower-conditioner knife that will work best in your conditions.

7 DEGREE TWIST KNIVES

The 7 degree twist knives, 1, are recommended for most cutting conditions. These knives function well in a wide range of field and cutting conditions. All Discbine® disc mower-conditioners and disc mowers are shipped with these knives from the plant.

Clockwise Knife 9847684
Counterclockwise Knife 9847683



The 14 degree twist knives, 2, are recommended in lighter crop conditions. A greater knife twist angle enables the knife's cutting edge to cut closer to the ground while providing more lifting action to move the crop over the cutter bar into the conditioner, producing a cleaner cut in most light crop conditions. However, because of the greater twist angle of the knife, these knives are more susceptible to rock damage.

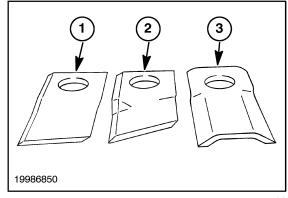
Clockwise Knife **86561093**Counterclockwise Knife **86561092**

V KNIVES

The V knives, 3, are recommended in rocky conditions where excessive knife bending is a concern. The V knife is to be installed with the concave side facing downward. This style knife has a greater resistance to bending when coming in contact with a foreign object. The cutting quality of this knife is not as good as with the twisted knives and will deteriorate with knife wear. However, they are more resistant to bending in rocky field conditions.

V Knife **86532078**

Note: 14 degree serrated knives are now avavilable for grass type hay crops



KNIFE REPLACEMENT

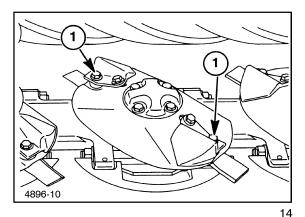
NOTE: Inspect the cutter bar for leaks or other needed repairs whenever performing service work on the bar. If a leak is found repair it immediately to prevent possible future failures.

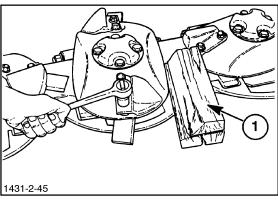
IMPORTANT: Always replace both knives on a disc to maintain balance. Do not intermix old and new knives on a disc.

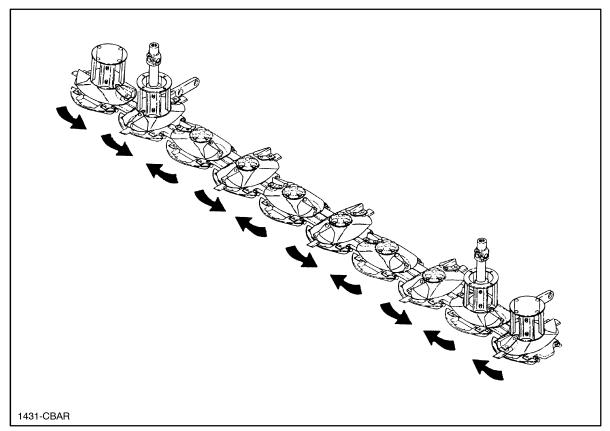
- 1. Remove the dirt around the knife bolt, 1.
- 2. Block the discs in place with a hardwood block, 1, or install a bar through an end tower.
- Remove the bolt with a socket as shown. If necessary hold the nut in place from the bottom with your hand. This will keep the nut from turning.

NOTE: If you are using an impact wrench use a bar to hold the nut in place, not your hand.

- 4. The knife and the nut can be removed from under the disc after the bolt is removed.
- 5. Knives can be turned over to use the opposite cutting edge after they become dull or nicked. All knives are angled. Knives are referred to as clockwise or counter- clockwise depending on which disc they are attached to.





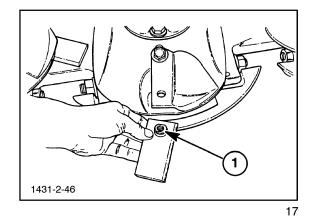


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6. The leading edge of the knives must be lower than the rear edge. On the Model 1431 and 1432 mower-conditioners, the two end discs on each end of the cutter bar rotate in the same direction (co-rotate); all other cutter bar discs rotate in opposite directions (counter-rotate). Refer to the accompanying drawing as to which way the discs turn.

- Install the nut through the knife and insert the nut,
 into the bottom of the discs aligning it with the slot in the disc.
- 8. Reinstall the knife bolt and torque it to 159 N⋅m (117 ft.-lbs.).

NOTE: After all knives are installed, turn the cutter bar by hand and check to be sure all knives are installed in the right direction and there is no interference.



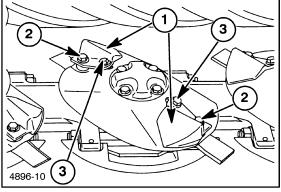
CROP LIFTER REPLACEMENT (MODEL 1431 ONLY)

The crop lifters should be inspected daily for wear or damage. Replace the lifters, 1, when the sloping surfaces wear thin or wear through, or if the lifter is bent or cracked.

Replace the lifter by removing the knife bolt, 2, and the lifter bolt, 3. It will be necessary to slide a wrench under the disc to hold the flange nut on the lifter bolt.

Torque the bolts to 159 N·m (117 ft.-lbs.).

IMPORTANT: Replace both lifters on a disc to maintain balance. Do not make weld repairs to the lifters, as this will affect lifter strength and balance.

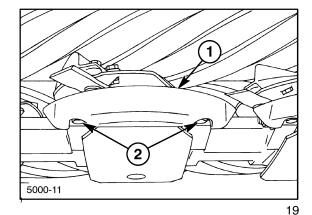


ROCK GUARDS

Rock guards, 1, can be removed by removing bolts, 2.

Broken rock guards should be replaced immediately.

Rock guards which are worn thin should be replaced before they break.



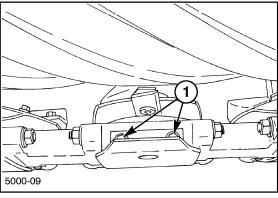
SKID SHOES

Skid shoes can be removed by removing bolts, 1. Reinstall the skid shoe by inserting the forward edge up into the rock guard, and lift the rear up to align the bolt holes.

NOTE: It may be easier to install the skid shoe by first loosening the rock guard mounting bolts, 2, Figure 4-19.

Broken skid shoes should be replaced immediately.

Skid shoes which are worn thin should be replaced before they break.



CUTTER BAR INSPECTION/FAILURE ANALYSIS

In the event of a failure of the New Holland modular disc cutter bar, it is important to properly inspect the unit to determine the extent of the damage. A thorough examination will help to locate all the damaged components, and minimize unnecessary repair labor. Often, it may not be necessary to remove and disassemble the cutter bar to repair or replace the failed components.

If a cutter bar failure is experienced, check the cutter bar components in the following sequence:

A. Inspect the external components for damage. paying particular attention to the knives, 1, lifters, 2, and discs, 3. Broken knives and bent or cracked discs and lifters are a result of contact with solid foreign objects, and may indicate possible internal damage. A disc out of time may also indicate internal damage; the discs are properly timed when they are positioned 90° to each other as shown.

Misalignment or gaps between the disc modules and spacers may indicate the tie bolts are loose or broken, or the dowel pins between the components have failed or are missing.

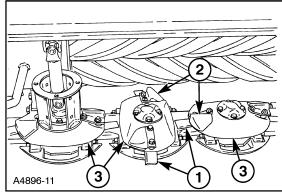
B. Carefully grab both ends of each disc, and try to "rock" the disc up and down. A small amount of movement 1.52 mm (0.060") is normal. An excessive amount of movement may be the result of a loose disc hub retaining bolt, or could indicate a worn top cap housing or bearings. Disc modules with excessive disc movement should have the disc retaining bolts, 113 N·m (83 ft.-lbs.) and disc hub bolt, 203 N·m (150 ft.-lbs.), or turn the bolt 90° after it has contacted the washer, checked for proper torque. Replace the disc hub retaining bolt if it has loosened. The bolt is equipped with a locking agent. If the bolts are tight, and movement still exists, the top cap assembly may need to be replaced.



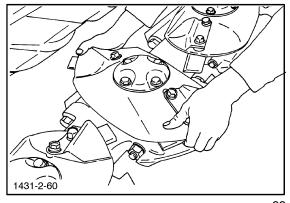
⚠ WARNING



The bottom leading edge of worn discs can become very sharp; wear gloves to prevent injury.



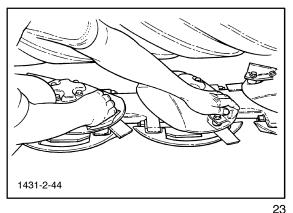
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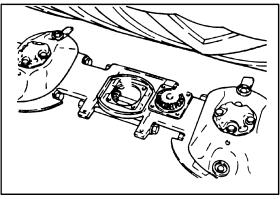
C. Starting at the left end of the cutter bar, grab both the #1 and #2 discs, and slowly rotate both discs while applying pressure to one of the discs against the direction of rotation. If one disc suddenly moves, it may indicate damage to the gear teeth in that module. Excessive free play between discs, or if one disc may be turned freely without the other disc moving, may indicate excessive wear or failure of the intermodule shaft. Some rotational free play 5 mm (3/16") between adjacent discs is normal, as a result of the backlash in both gear sets.

Check all disc modules by working gradually across the cutter bar, checking each disc to the next disc. In some cases, two adjacent modules may sustain damage from the same event, or there may be two separate failures on the cutter bar, involving modules in different locations.

D. After checking all disc modules for evidence of internal failure, remove the discs and top cap assemblies of any module with suspected damage. Inspect both the top cap assembly and the lower module assembly for bearing play or damage, and gear tooth damage. Grab the pinion shaft, and rotate the adjacent discs to check for play in the intermodule shaft splines. If only the top cap assembly components are damaged, it is not necessary to disassemble the cutter bar further. Before installing the replacement top cap assembly, drain the oil, flush the lower module with a cleaning solvent to remove contaminants and install fresh API GL5 80W90 oil.





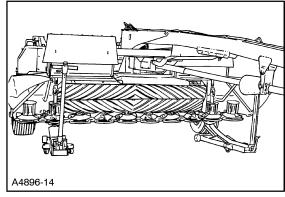


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E. The cutter bar should only be removed from the machine and disassembled if it has been determined that the lower module components or the intermodule shafts are damaged. Ensure that all disc modules were checked as per steps B, C, and D to determine which modules require removal for repair or replacement. Check the intermodule shafts on both sides of a failed disc module for worn or twisted splines.

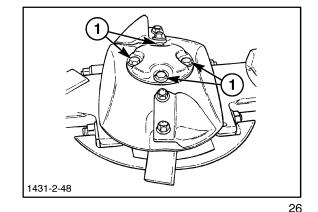
The cutter bar should also be removed and disassembled if misalignment or gaps between the modules and spacers was noted in step A. Check the intermodule shafts and pinions shafts for excessive spline wear at any connection where the tie bolts were found to be loose or failed, or where misalignment occurred due to missing or failed dowel pins. Note that dirt will tend to work its way inside spacers where the tie bolts are loose.

NOTE: Following all of the above listed steps when inspecting a failed cutter bar, ensure all components are checked. Any worn or failed components should be identified prior to disassembly and repair of the cutter bar.

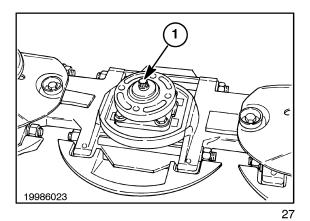


TOP CAP REMOVAL

 Block the cutter bar discs in place with a hardwood block, or install a bar through an end tower to lock up the cutter bar, and remove the disc of the affected module by removing the four retaining bolts, 1, securing the disc and cover to the disc hub.



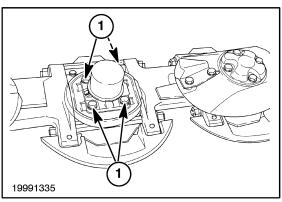
- 2. Clean any material buildup from around the disc hub and top cap assembly.
- 3. With the cutter bar blocking still in place, remove the disc hub retaining bolt, 1.



4. Remove the hub, and remove any remaining material buildup on top of module and top cap assembly.

NOTE: Removing the disc hub will expose the upper bearing in the top cap assembly. Cover this area with a cloth, or use special tool #FNH23ET95 to prevent contamination from entering the bearing.

5. Remove the four retaining bolts, 1, and pry the top cap assembly off the lower module.

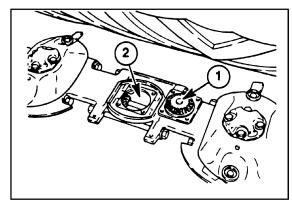


INSPECTION

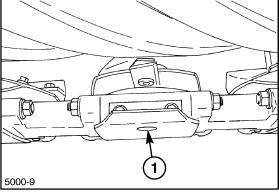
- Inspect the top cap assembly, 1, for excessive play in bearings, bearing damage, and gear tooth damage.
- Inspect the lower module assembly, 2, for evidence of damage to pinion gear teeth or excessive shaft movement in any direction.

If the top cap assembly is damaged, but the lower module assembly is not, the lower module should be flushed out to remove any contaminants.

- a. Drain the oil out of the module by removing the drain plug, 1, through access hole in skid shoe. After the oil has drained, flush out the lower module with a cleaning solvent. Use a magnet to remove any large pieces of debris from the lower module assembly.
- Apply sealant to the drain plug, and reinstall it in the lower module. Pour 300 ml (10 oz.) of API GL5 80W90 oil through the top opening into the lower module.



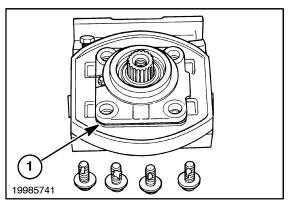
29



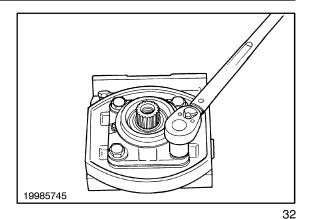
ب 30

TOP CAP INSTALLATION

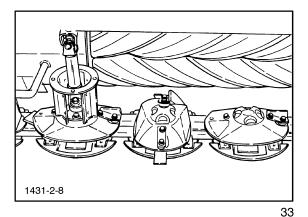
 Apply a thin bead of silicone sealant to the sealing flange of the new top cap assembly, 1, and position it on the lower module assembly with the breather facing to the right.



 Apply silicone sealant to the end of the threads of the top cap retaining bolts, install them, and torque to 113 N·m (83 ft.-lbs.).



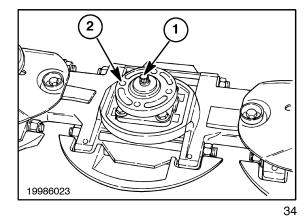
 It is necessary to time the cutter bar discs during reassembly to eliminate interference between the knives. The discs are properly timed when they are 90° apart, as shown. The disc hub and top cap shaft splines are randomly cut, with no index marks.



Apply a thin coating of grease to the seal lip and surface on disc hub. Slide the disc hub onto the top cap shaft; if it is not perfectly timed to the adjacent discs, remove the disc hub, rotate it 90° and reinstall it. Continue to do this until the disc hub is properly timed; one of the four positions will provide correct timing.

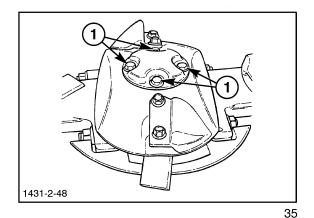
NOTE: With the adjacent discs positioned at 90°, the breather should be completely visible through the disc hub bolt hole, 2, when the hub is properly timed.

4. If the module has a hex head cap screw, discard this bolt and install a new 12-point bolt. Apply a small amount of silicone sealant to the end of the disc hub retaining bolt, 1, and torque it to 203 N·m (150 ft.-lbs.), or turn the bolt 90 degrees after it has contacted the washer.

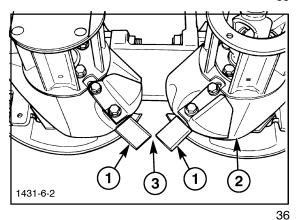


58-18

5. Install the disc assembly and cover. Torque retaining bolts, 1, to 113 N·m (83 ft.-lbs.).

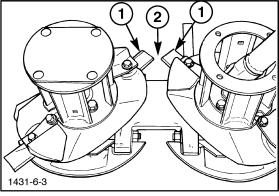


6. The disc timing is critical on the co-rotating end discs to prevent the knives from contacting each other during normal operation, and should be checked again after the discs are installed to ensure it is correct. Position the knives, 1, straight out from the discs, and rotate the discs by turning the inner disc, 2, in the direction of rotation until the knives are at their closest position at the front of the cutter bar. Measure the clearance, 3, between the knives.



7. Continue to rotate the inner disc in the direction of rotation until the knives, 1, are at their closest position at the rear of the cutter bar. Measure the clearance, 2, between the knives; it should be within 3mm (1/8") of the clearance measured at the front.

If the clearance is more than 5 mm (3/16") different from the clearance measured at the front, the end disc and tower should be removed, and the end disc module retimed to the inner disc.



Rotary disc cutting - Visual inspection - Cutter bar inspection

AWARNING

Moving parts!

Disengage the Power Take-Off (PTO), turn off the engine, and remove the key. Wait for all movement to stop before leaving the operator's position. Never adjust, lubricate, clean, or unplug machine with the engine running. Failure to comply could result in death or serious injury.

AWARNING

Avoid injury!

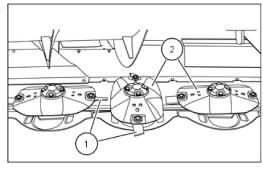
Replaced damaged knives, knife hardware, or discs immediately to prevent an accident. This includes cracked or severely deformed knives.

Failure to comply could result in death or serious injury.

The cutter bar should be inspected for damage or wear on a regular basis, such as when turning or replacing knives. Inspect the cutter bar more frequently when operating in known rocky conditions.

Inspect the external components for damage, paying particular attention to the knives (1) lifters (if applicable) and discs (2).

- Broken knives and bent or cracked discs and lifters are a result of contact with solid foreign objects, and may indicate possible internal damage. A disc out of time may also indicate internal damage; the discs are properly timed when they are positioned 90 ° to each other.
- Misalignment or gaps between the disc modules and spacers may indicate the spacer bolts are loose or broken, or the dowel pins between the components have failed or are missing.



93107691 1

Carefully grab both ends of each disc, and try to 'rock' the disc up and down.

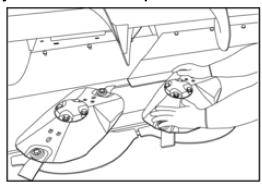
3. ACAUTION

Sharp object!

Wear gloves when handling worn discs. Failure to comply could result in minor or moderate injury.

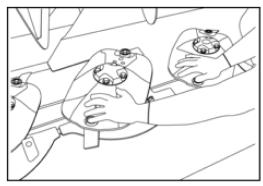
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A small amount of movement [**0.8 mm** (**1/32 in**)] is normal; an excessive amount of movement may be the result of a loose disc hub retaining bolt, or could indicate a worn top cap housing or bearings. Disc modules with excessive disc 'rock' should have the disc bolts and disc hub bolt checked for proper torque. If the bolts are tight, and movement still exists, the top cap assembly may need to be replaced. Contact your authorized dealer for more information.



Starting at the left end of the cutter bar, grab both the #1 and #2 discs, and slowly rotate both discs while applying pressure to one of the discs against the direction of rotation.

- 4. If one disc moves, it may indicate failure of the shock hub in that module. Excessive free play between discs may indicate excessive wear or failure of the intermodule shaft. Some rotational free play 4.75 mm (3/16 in) between adjacent discs is normal, as a result of the backlash in both gear sets.
- Check all disc modules by working gradually across the cutter bar, checking each disc to the next disc.
- 6. After checking all disc modules for evidence of internal failure, remove the discs and top cap assemblies of any modules with suspected damage. Inspect both the top cap assembly and the lower module assembly for bearing play or damage and gear tooth damage. Grasp the pinion shaft and rotate the adjacent discs checking for play in the intermodule shaft splines. If only the top cap assembly components are damaged, it is not necessary to further disassemble the cutter bar. Before installing a replacement top cap assembly, drain the oil and flush the lower module with a cleaning solvent to remove contaminants. Refill with fresh CASE IH AKCELA GEAR 135 H EP 80W-90 or CASE IH AKCELA GEAR LUBE SSL 75W90.
- Remove the cutter bar if checking the disc modules reveals the lower module components or the intermodule shafts to be damaged or misalignment or gaps were found between the modules and spacers.

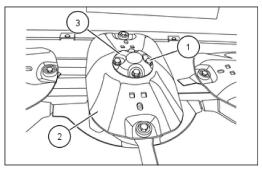


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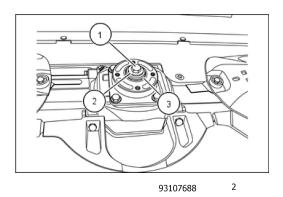
Rotary disc cutting - Remove - Shock hub top cap

The header must be level front to back and side to side. Position the machine on a level surface, with the header locks engaged, extend the tilt cylinder until the header is level.

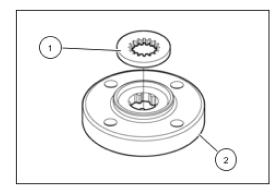
- 1. Remove four bolts (1) from disc.
- 2. Remove disc (2) and bolt cover (3).



3. Remove hex head bolt (1) hardened washer (2) and conical washer (3).

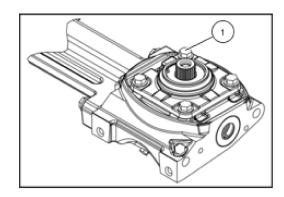


- 4. Remove splined washer **(1)** and shock hub **(2)** together from disc module.
- 5. Wipe entire area clean of metal fines.

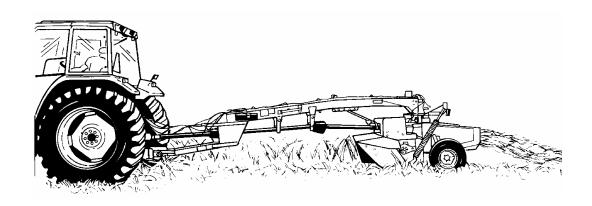


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6. Remove the four bolts and lock washers (1) securing the top cap assembly to the disc module. Torque to 200 ft. lbs. on heavy duty gearbox.



Disc and Sickle Mower Conditioners Technical Training

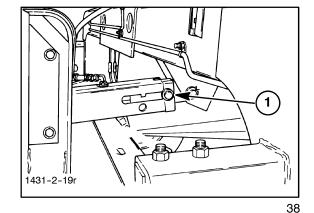


Cutter Bar Disassembly

CUTTER BAR REMOVAL

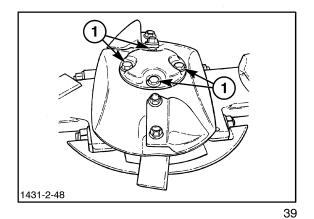
On the 1431/1432, the cutter bar must be removed if a lower module assembly requires replacement or repair.

1. Raise the header and engage the transport locks. Install the pin, 1, to lock the hydraulic header tilt cylinder in the 2 degree position.

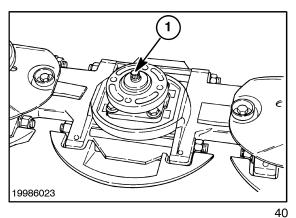


 Block the cutter bar discs in place with a hardwood block, or install a bar through the right end tower to lock up the cutter bar. Remove the four retaining bolts, 1, securing the disc and

cover to the disc hub of the defective module.



3. Clean any material buildup from around the disc hub and top cap assembly as possible. With the cutter bar blocking still in place, loosen the disc hub retaining bolt, 1.

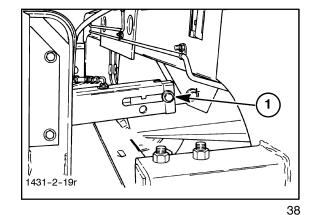


58-20

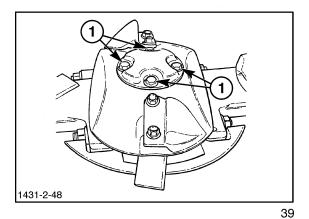
CUTTER BAR REMOVAL

On the 1431/1432, the cutter bar must be removed if a lower module assembly requires replacement or repair.

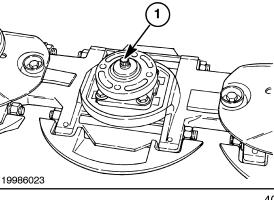
1. Raise the header and engage the transport locks. Install the pin, 1, to lock the hydraulic header tilt cylinder in the 2 degree position.



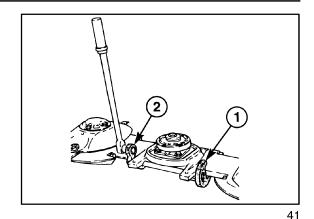
2. Block the cutter bar discs in place with a hardwood block, or install a bar through the right end tower to lock up the cutter bar. Remove the four retaining bolts, 1, securing the disc and cover to the disc hub of the defective module.



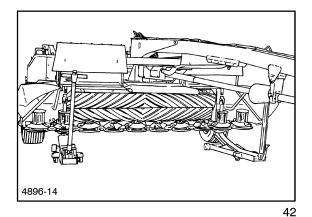
3. Clean any material buildup from around the disc hub and top cap assembly as possible. With the cutter bar blocking still in place, loosen the disc hub retaining bolt, 1.



4. The tie bolts clamping the spacers to the disc modules are extremely tight, and are easier to loosen while the cutter bar is still clamped in the header frame. To gain access to the tie bolts, remove the rock guard and skid shoe from the defective module. Loosen the tie bolts by using the holding tools #FNH01221-2, 1, on one end of each tie bolt. Use wrench #FNH01221-3, 2, with a 3/4" breaker bar to loosen the tie bolts 1/2 turn total by turning the front and rear nuts alternating one flat at a time.

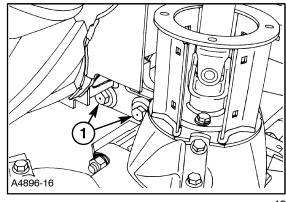


5. Place a floor jack under each end of the cutter har



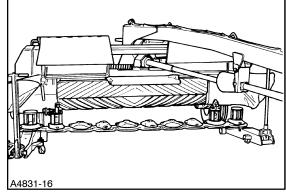
 Special nuts and bolts are used to retain the cutter bar on each end of the cutter bar. Remove the two nuts and slide the bolts, 1, out of the bayonet arms.

NOTE: If the bolts do not slide out easily, slightly raise or lower the cutter bar using the floor jacks.



7. Lower the floor jacks and roll the cutter bar out from under the header.

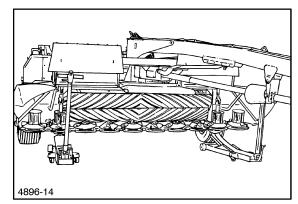
NOTE: The drive shafts will slide off and stay with the cutter bar.



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CUTTER BAR INSTALLATION

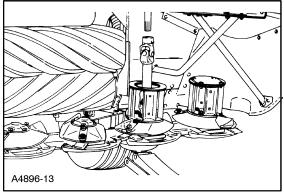
- 1. Support the cutter bar with floor jacks positioned under each end.
- Roll the cutter bar under the header, positioning the bayonet arms so that they line up with the slots in the header frame.
- 3. Raise the cutter bar with the floor jacks until the top of the drive shafts are even with the gearbox output and pedestal shaft.



45

 Line up the drive shaft splines with the gearbox output and pedestal shaft. Raise the cutter bar until the bayonet arms line up with the header frame mounts.

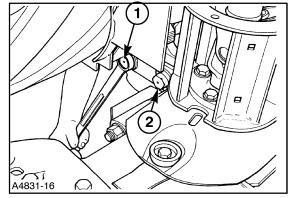
NOTE: It may be necessary to loosen one header drive belt so that the gearbox output shaft and pedestal shaft may be turned individually to align with the drive shaft yokes.



5. Position the cutter bar so that the rear bolt holes are lined up. Install the rear bolt, 1, through the mount and bayonet arm, and secure with the nut. Install the nut with the tapered side facing towards the mount.

Raise or lower the front of the cutter bar as required to install the front bolt/nut, 2.

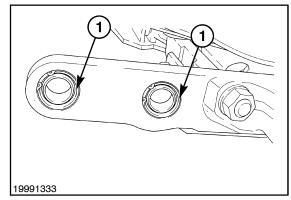
After all four mounting bolts are installed, torque the hardware to 271 N·m (200 ft.-lbs.).



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CUTTER BAR BAYONET BUSHING - REPLACEMENT

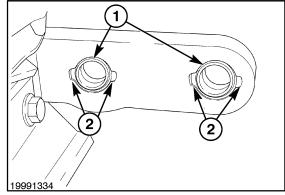
- To replace the cutter bar bayonet bushings, the cutter bar must first be removed from the unit; refer to "Cutter Bar Removal."
- 2. Remove the snap ring, 1, from the bayonet arm.



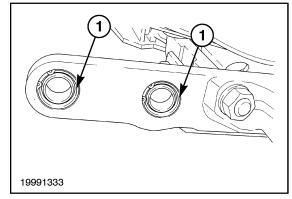
48

3. Using a hammer and punch, evenly drive the bushing out of the bayonet arm by striking the outer race, 1, of the bushing. On older units, it may be necessary to grind two small notches, 2, in the bayonet arm using a die grinder to provide access to the outer race of the bushing. Drive the bushing out slowly to prevent damaging the bayonet arm.

NOTE: Do not drive against the inner ball of the bushing to remove it, or the bayonet arm will fracture and break.



- Install the new bushing into the bayonet arm by driving against the outer race of the bushing. Drive the bushing in slowly, ensuring that it does not cock sideways in the bayonet arm.
- 5. Reinstall the snap ring, 1, to retain the bushing.



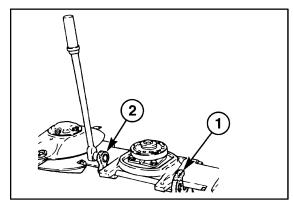
50

CUTTER BAR DISASSEMBLY

 If not already removed, remove the disc, rock guard and skid shoe from the defective module in order to gain access to the tie bolts. Loosen the tie bolts by using the holding tools #FNH01221-2,
 on one end of each tie bolt. Use wrench #FNH01221-3, 2, with a 3/4" breaker bar to loosen the front and rear nuts alternately a flat at a time until nuts can be turned freely by hand.

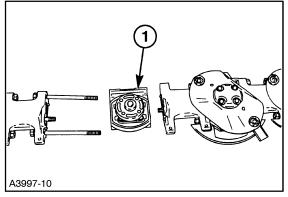
IMPORTANT: Do not loosen one nut completely as this will cause cutter bar to bow and may cause failure of the opposite tie bolt.

NOTE: If the tie bolts were not previously loosened with the cutter bar on the machine, it will be necessary to secure the cutter bar in some manner prior to attempting to loosen the tie bolts.



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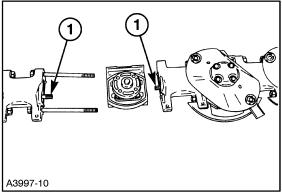
2. Slide the cutter bar apart far enough to allow removal of the disc module, 1.



52

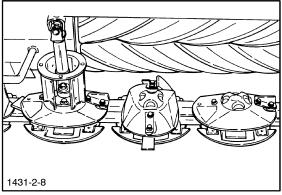
CUTTER BAR REASSEMBLY

 Prior to reassembly, remove the connecting shafts, 1, from both spacers, and apply special lubricant part# 9861804 to both ends of the shafts. Reinstall the connecting shafts.

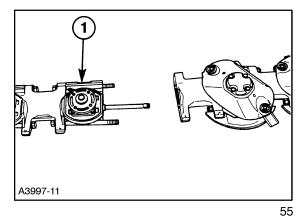


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2. It is necessary to time the cutter bar discs on either side of the replacement module during reassembly to eliminate interference between the knives. The discs are properly timed when they are 90° apart, as shown. Rotate the discs of the modules on either side of the replacement module so that they are timed to each other.

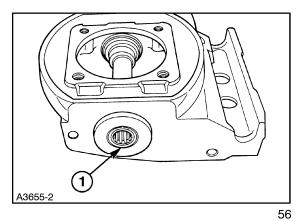


 Install the replacement module, 1, on one end of the cutter bar so that the connecting shaft splines into the pinion shaft, the tie bolts are properly positioned and the module housing fits onto the aligning dowels on the spacer.

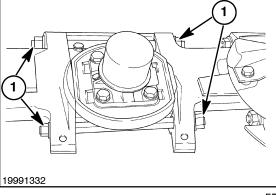


It may be necessary to determine the direction of rotation of a replacement module prior to installing it in the cutter bar. Note that the pinion end of the lower module shaft has a groove, 1, in it to indicate which side of the module the pinion gear is on, which indicates the direction of rotation. If the groove (pinion) is on the right side of assembled module, module will rotate clockwise, while a module with the groove

(pinion) on the left will rotate counter- clockwise.



- 4. Slide the cutter bar together so that the other connecting shaft splines into the pinion shaft, and the spacer aligning dowels engage the holes in the disc module. Ensure that the discs on either side of the replacement module remain timed to each other.
- 5. Install the nuts, 1, onto the tie bolts, and tighten finger tight, ensuring that the tie bolt threads protrude out of the nuts on both ends for full thread engagement in the nuts.



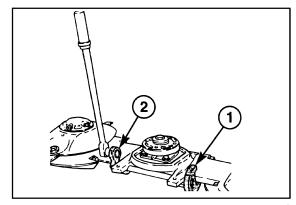
6. The tie bolts which connect the cutter bar together are torqued using the degree method of torquing, which requires a special procedure. Install holding tools #FNH01221- 2, 1, onto the nuts on one end of each tie bolt. Then, using tool #FNH01221-3, 2, with a torque wrench, torque both tie bolts to 68 N·m (50 ft.-lbs.).

NOTE: Always torque or turn the rear tie bolt first.

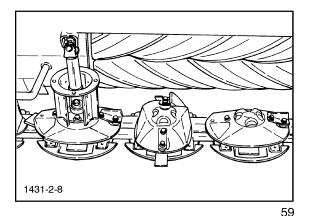
7. Use a marker or scribe to mark the front and rear nut positions relative to the spacer. Using wrench #FNH01221-3 and a 3/4" breaker bar, turn each nut 1/2 turn at a time to achieve **five flats** on the tie bolt nut, starting with the rear tie bolt first. This will give a total torque on the tie bolt of 68 N·m (50 ft.-lbs.) plus **5 flats,** for a clamping force of 15870 to 16780 kg (35,000 to 37,000 lbs.).

NOTE: It may be necessary to partially torque the tie bolts, mount the cutter bar assembly back onto the unit, and use a cheater bar to obtain enough leverage to complete tightening the tie bolts.

8. Remove special tools from the cutter bar; it may be necessary to use a hammer to knock the holding tools #FNH01221-2 off of the nuts.



9. The replacement module must be timed to the rest of the cutter bar by properly positioning the disc hub on the top cap assembly. The discs are properly timed when they are 90° apart, as shown. The disc hub and top cap shaft splines are randomly cut, with no index marks.

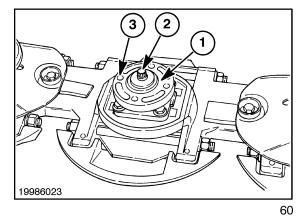


Slide the disc hub, 1, onto the top cap shaft. If it is not perfectly timed to the adjacent discs, remove the disc hub, rotate it 90° and reinstall it. Continue to do this until the disc hub is properly timed; one of the four positions will provide correct timing.

NOTE: With the adjacent discs positioned at 90°, the breather should be completely visible through the disc hub bolt hole, 3, when the hub is properly timed.

After determining the correct position, apply a thin coating of grease to the seal lip and sealing surface on disc hub, and carefully slide disc hub onto shaft past seal. Install a new disc hub retaining bolt, 2, and torque it to 203 N·m (150 ft.-lbs.), or turn the bolt 90 degrees after the bolt has contacted the washer.

10. Reinstall the rock guard, skid shoe and disc on the replacement module.



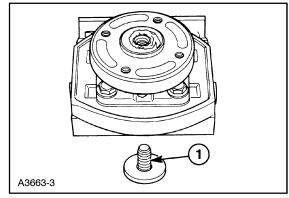
58-28

DISC MODULE - DISASSEMBLY

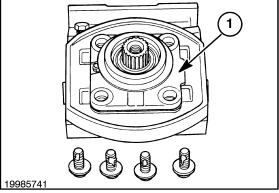
 Remove the disc hub by removing the center retaining bolt, 1. It will be easier to remove the disc hub if the bolt is loosened prior to removing the module from the cutter bar. Clean off any material buildup on top of the module and the top cap assembly.

NOTE: Removing the disc hub will expose the upper bearing in the top cap assembly. Cover this area with a cloth, or use special tool #FNH23ET95 to prevent contamination from entering the bearing.

2. Remove the four retaining bolts and pry the top cap assembly, 1, off the lower module.

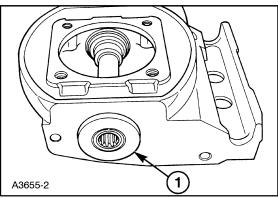


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— 62

3. Pry the seals, 1, from each side of the lower module, using caution not to damage the shaft surface.



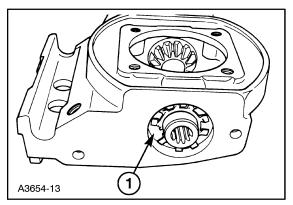
 Use a pair of snap ring pliers to carefully remove the slingers, 1, on each end of the lower module shaft.

IMPORTANT: Use caution to prevent the tips of the slingers from contacting the sealing surface on the end of the shaft, or seal failure will occur.

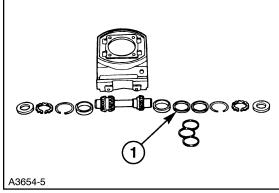
- Remove the snap rings from each side of the module.
- Slide the lower module shaft, bearings and spacer washers out of the module housing. Note the orientation of the shaft in the housing prior to removing it, as this determines the direction of rotation of the disc module.

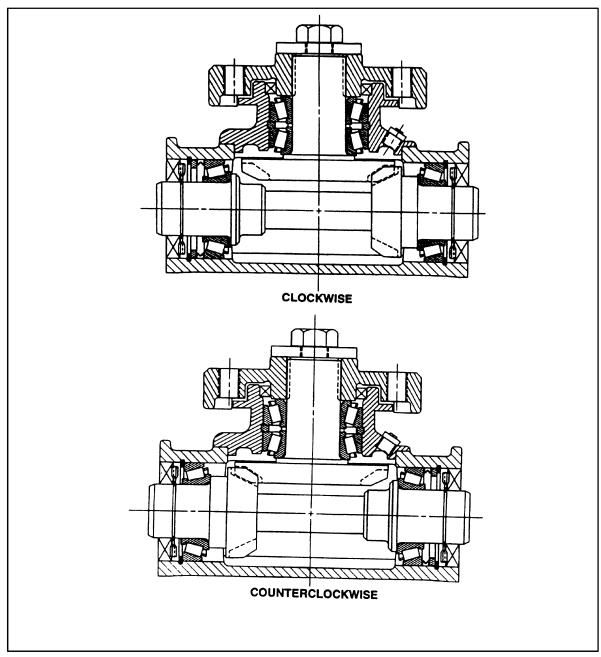
If module has not been previously repaired, a compression shim washer, 1, will be on the lower module shaft instead of individual shims.

NOTE: If the lower module shaft is to be reused, use a non-metallic abrasive pad to clean any dirt or corrosion from the sealing surfaces. Do not use emery cloth or steel wool as this will damage the sealing surface.



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DISC MODULE - ASSEMBLY

Disc modules can be assembled for clockwise or counterclockwise rotation of the disc. Before assembling a disc module it must be determined at which cutter bar location the disc module will be used to ensure it is assembled for proper rotation.

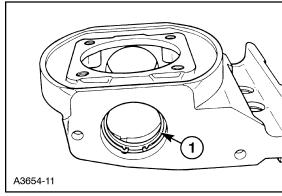
When looking at a disc module from the rear, a counterclockwise module will have the pinion gear on the left side, and a clockwise module will have the pinion gear on the right side. The direction of rotation of an assembled module can be determined by looking at the ends of the lower module shaft; the pinion end of the shaft has a shallow groove in the end to identify it.

The backlash of the assembled disc module is controlled by precision machining of the disc module and top cap housings, the use of precision forged gears, and the use of low tolerance bearings, which are manufactured to provide a specific "stack height," or combined thickness. The backlash in the gear set should be 0.13 - 0.28 mm (0.005" - 0.011") after the module has been assembled.

If the back lash is found to be incorrect after module repair with new parts, recheck the module for correct assembly of all components.

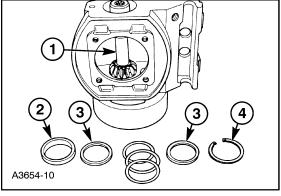
NOTE: Each bearing for the pinion shaft is manufactured for a specific "stack height". Do not mix old and new bearing components or substitute with "jobber" bearings.

 Install a snap ring, 1, on the pinion side of module casting. Slide the bearing cup for the pinion side bearing into the housing bore against snap ring. Note that the direction of rotation desired will affect which side of housing you start on. For example, install snap ring on right side of housing for clockwise rotation, and on the left side of housing for counter-clockwise rotation.



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- 2. Support the module housing approximately 1/2" above the work surface on blocks, a large piece of pipe as shown, or in an open vise. Position the snap ring and bearing cup down. Slide the assembled lower module shaft, 1, into housing, making sure pinion side is down against snap ring to orient properly for desired direction of rotation.
- 3. Install the bearing cup, 2, for the upper bearing cone into the housing. Place the two spacer washers, 3, on top of the bearing cup, and install the snap ring, 4, into the groove in the housing.



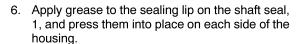
4. Check the end play of the pinion shaft with the pinion side facing down, to ensure an accurate measurement. Rotate the shaft two complete revolutions to seat all components (bearing rollers in cage), and install a dial indicator to measure shaft end play. Use a screwdriver or punch to pry upwards on the pinion gear to obtain an end play reading; allowable end play is 0.05 - 0.20 mm (0.002" - 0.008"). Remove the snap ring and add the required thickness of shims between the spacer washers to achieve the correct end play.

NOTE: The shims must be sandwiched between two hardened washers to protect them from the bearing and the snap ring groove.

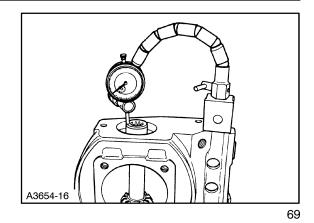
Recheck the end play as described above to ensure the assembled end play is correct.

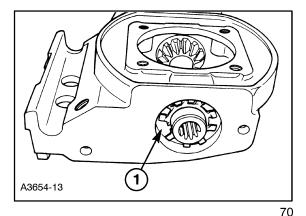
5. Install an oil slinger, 1, into the groove on each end of the pinion shaft. Be careful not to scratch the sealing surface on the shaft as this will cause the shaft seal to leak, causing module failure. The slingers are bidirectional in nature, and may be installed in either direction on the shaft.

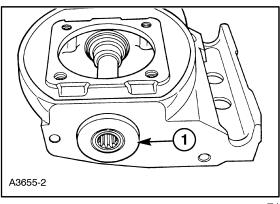
IMPORTANT: Use caution to prevent the tips of the slingers from contacting the sealing surface on the end of the shaft, or seal failure will occur.



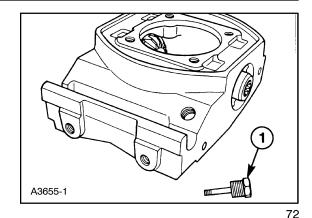
NOTE: The seal must be pressed into place with a seal installing tool or suitable substitute. The seals must be flush with the side of the housing, and square to the shaft. If the seal is driven in with a hammer, it will be distorted and leak, causing disc module failure.







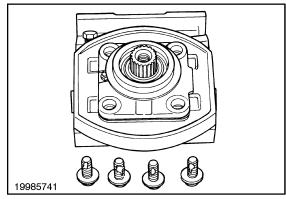
 Apply silicone sealant to the threads of the drain plug and check plug, 1. Install them into the housing and pour 300 ml (10 oz.) of API GL5 80W90 gear oil through the top opening into the lower module.



8. Apply a thin bead of silicone sealant to the sealing flange of the new top cap assembly, and position it on the lower module assembly with the breather facing to the right. Apply silicone sealant to the end of the threads of the top cap retaining bolts, install them and torque to 113 N·m (83 ft.-lbs.).

Do not install the disc hub onto the top cap at this time, unless it is desired to check backlash. To check backlash, the disc hub must be installed and torqued to 203 N·m (165 ft.-lbs.) to seat bevel shaft against bearings and housing.

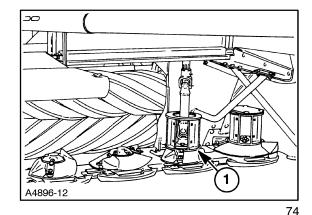
Acceptable backlash is 0.13 - 0.28 mm (.005'' - .011''). If backlash is unacceptable, recheck assembly of the disc module.



CUTTER BAR DRIVE SHAFT - REMOVAL

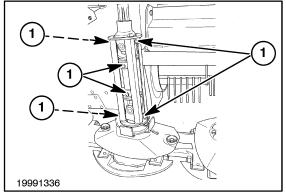
This Step Model 1431 (Below SN 638668)

 Remove the four cap screws retaining the cutter bar drive shaft, tower and disc to the disc hub at
 Lift the tower and drive shaft slightly to clear the disc hub bolt, and pull them forward so the upper end of the drive shaft slides off the splined shaft.



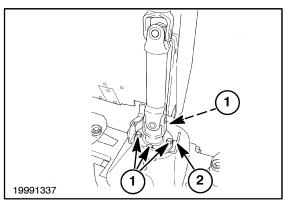
This Step Model 1432 and 1431 (Above SN 638668)

1. Remove the six cap screws, 1, retaining the tower to the cutter bar drive shaft.



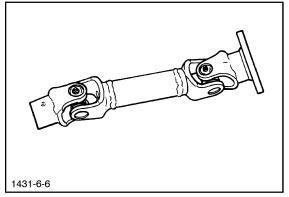
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2. Remove the four cap screws, 1, retaining the cutter bar drive shaft to the disc. Lift the drive shaft slightly to clear the star wheel, 2, and the disc hub bolt. Pull the drive shaft forward to allow the drive shaft to slide off the splined shaft.



CUTTER BAR DRIVE SHAFT - DISASSEMBLY

1. The drive shaft contains two U-joints, which may be serviced individually.

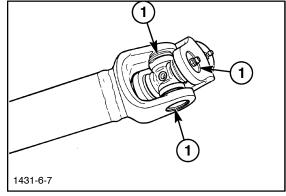


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2. The U-joint bearing cups are retained with external-type snap rings, 1, positioned on the inner side of the yoke ears. Remove the snap rings by positioning a screwdriver against the open end of the snap ring, and give a light blow to the screwdriver to pop the snap ring off the bearing cup.

Remove the grease zerk, 2, from the one bearing cup.

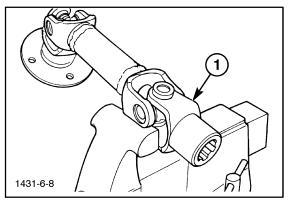
NOTE: The grease zerk is oriented to line up with other grease zerks on the drive shaft. Note the positioning of the grease zerk prior to removal.



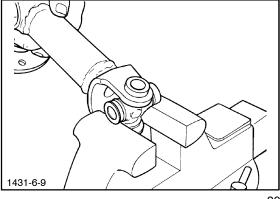
Position the joint in an open vise, with each ear
of one yoke supported by a vise jaw. With a soft
hammer or mallet, strike the top ear of the
unsupported yoke at 1. This will drive the top
bearing outward approximately 8 mm (1/4").

IMPORTANT: Do not use a hard faced hammer, as this may damage the edge of the bearing cup bore in the yoke, causing the bearing cup to hang up or seize in the yoke.

- Pull the bearing out of the yoke ear. If necessary, grip the loosened bearing in a vise, and drive the yoke off the bearing by striking the yoke ear with the soft faced hammer or mallet.
- This same procedure should be followed to remove the bearing directly opposite the one just removed, after which the yoke itself may be removed.
- 6. To remove the remaining two bearings, support the cross in the vise, making certain the vise jaws are covered with brass protectors or the previously removed bearings are reinstalled on the cross. By striking the yoke ear, the bearings can be removed as per steps 4 & 5.



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Rotary disc cutting - Replace - Cutter bar module - SP and Pivot Tongues

ADANGER

Crushing hazard!

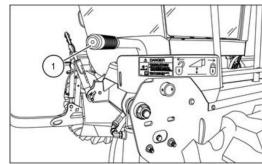
Safety locks built into the header lift system lock the header in the raised position. Engage the safety locks on both sides before working under a raised header.

Failure to comply will result in death or serious injury.

D0029A

The header must be level front to back and side to side. Position the machine on a level surface, with the header locks engaged, extend the tilt cylinder until the header is level.

1. Engage the header lift locks by pulling rearward on the handle **(1)**.

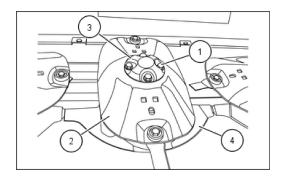


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- 2. Remove the shield by removing hardware .
- 3. Remove the hardware securing the disc drive shaft and drum to drive hub.
- Remove the drive shaft, drum and disc from cutter bar.

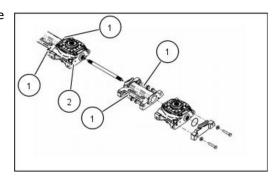
NOTE: Remove drive shaft from the nearest end module. Left-hand side shown for reference.

- 5. Remove four bolts and lock washers **(1)** from each disc outboard of the failed module.
- 6. Remove disc (2) and bolt cover (3) from all modules outboard of the failed module.
- 7. Remove the rock guard **(4)** from the failed module.



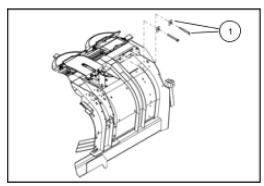
93107687 3

- 8. Remove the skid shoe **(1)** from the failed module and all of the skid shoes outboard of that module (the side that is closest to the failed module).
- 9. Remove hardware **(1)** that fastens the adjacent spacers from the failed module **(2)**.



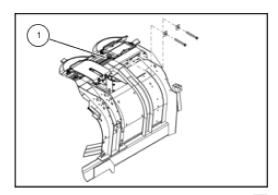
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10. Remove the hardware (1) from the module to be removed and all of the modules outboard of that module on one side (the side that is closest to the failed module).



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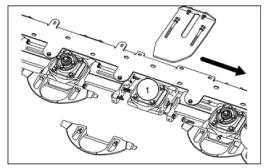
Loosen but do not remove the vertical bolts (1)
that go through the slots in the spacers that are
outboard of the failed module and the failed
module.



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5.0

12. Slide the modules that have been loosened from the beam outboard as far as the spacer slots allow. The spacers that are adjacent to the failed module (1) are now far enough apart to allow the connecting drive shafts to be disengaged and allow the failed module to be removed.



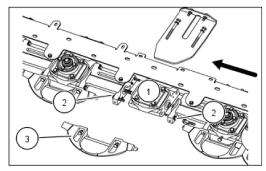
93110135 8



13. Install the new module (1) and engage the connecting drive shaft from the inboard spacer into the new module. Slide the modules that have been loosened from the beam inboard towards the new module and engage the connecting drive shaft into the new module.

NOTE: Be sure the wave washers are installed on the pilot ends of the connecting shafts. A coating of general purpose grease on the wave washer will help keep the wave washer on the shaft during installation.

- 14. Install and torque hardware (2) that fastens the adjacent spacers to the new module. Torque hardware to 113 N·m (83 lb ft).
- 15. Install the rock guard (3) and torque hardware to 164 N·m (121 lb ft).

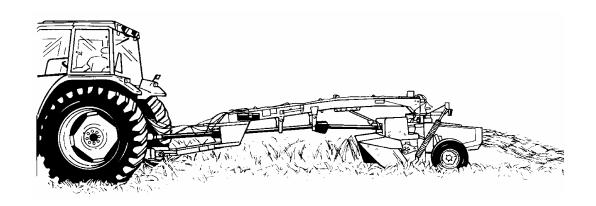


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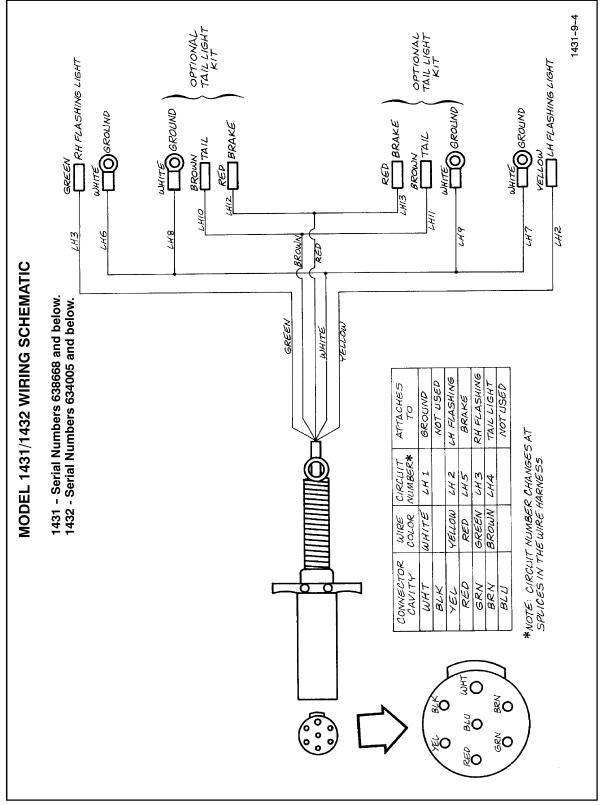


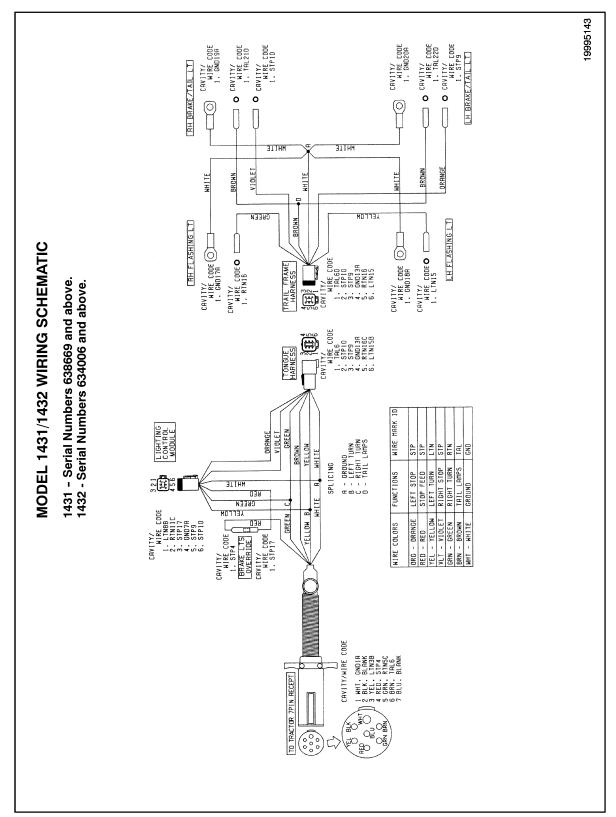
- 16. Install the hardware (1) securing the back side of each module to the header frame. Torque hardware to 113 N·m (83 lb ft).
- 17. Torque the vertical bolts (2) that go through the slots in the spacers to 113 N·m (83 lb ft).

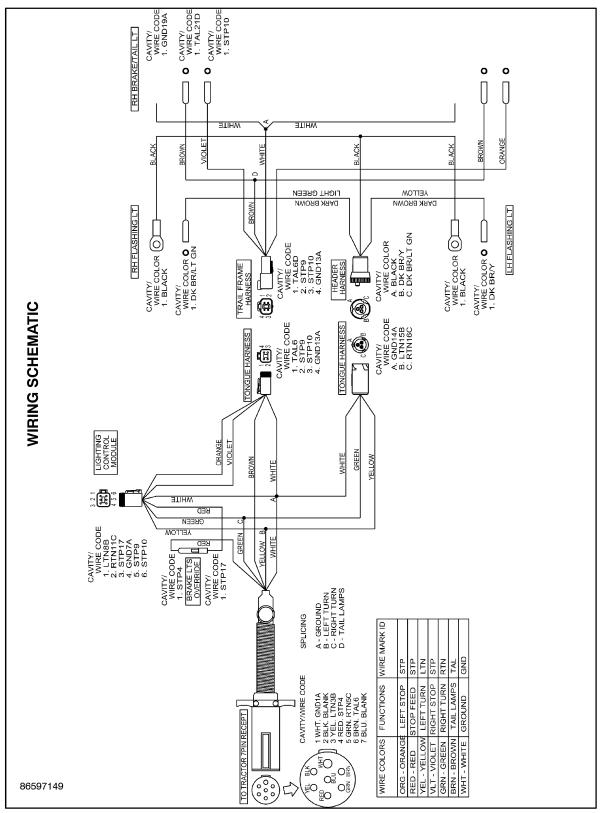
Disc and Sickle Mower Conditioners Technical Training



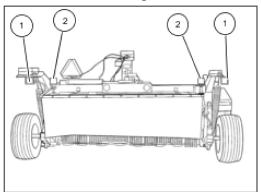
Electrical & Hydraulic







Flail conditioning



Implement lights

The following chart details the transport light operation with a seven-pin SAE J560 male connector. Refer to "Transport Light Connector Socket" below for more information on J560 connectors.

NOTE: Left and right are determined by standing behind the unit, facing the normal direction of travel.

	Implement Ligh	its		
Tractor Lights	Left Amber	Left Red	Right Red	Right Amber
Headlights "OFF"	-	Off	Off	-
Headlights "ON"	-	Dim	Dim	-
Amber Flashing Lights "OFF"	Off	1	-	Off
Amber Flashing Lights "ON"	Flashing (same rate as right)	-	-	Flashing (same rate as left)
Brake Lamps* (brakes applied) Amber Flashing Lamps "ON" — no turn indicated (no tractor brake lamps)	1	Bright*	Bright*	-
	Flashing (same rate as right)	Bright*	Bright*	Flashing (same rate as left)
Amber Flashing Lamps "ON" —no turn indicated (no	Flashing (same rate as right)	Off**	Off**	Flashing (same rate as
tractor brake lamps)				left)
Left Turn Indicated	Increased flash rate	Off, dim, or flashing*** in unison with left	Off or dim	Illuminated, no flashing
Right Turn indicated	Illuminated, no flashing	Off or dim	Off, dim or flashing*** in unison with right	Increased flash rate

NOTE: Check local laws or regulations concerning agricultural machinery lighting and marking.

NOTE: It is recommended that headlights be illuminated, "ON", for traveling on roads.

NOTE: The lighting control box is used to control the amber lamps and brake light circuits. The tail lamps are on only when the tractor park or road lights are on.

^{*} Implement brake lights (red) to illuminate when tractor brakes applied (tractor with brake lights).

^{**} If tractor is not equipped with brake lights, contact your authorized NEW HOLLAND AGRICULTURE dealer to purchase implement light control module to attain enhanced turn signal function; installation instructions follow.

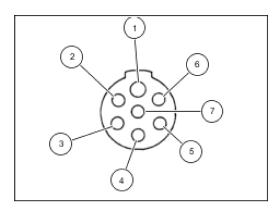
^{***} Brake light (red) flashes in unison with amber flasher indicating direction of turn if the tractor is not equipped with brake lights — requires implement light control module — contact your authorized NEW HOLLAND AGRICULTUREdealer to purchase implement light control module; installation instructions follow.

The disc mower-conditioner trailing light wire harness uses a 7-pin trailer connector to connect the mower-conditioner to a tractor electrical socket which conforms to **SAE J560**. For proper light function, this unit must be connected to a tractor incorporating an **SAE** standard 7-pin conductor electrical socket which conforms to **SAE J560**. If your tractor does not have a 7-pin conductor electrical socket, obtain a connector socket from your authorized dealer.

Socket installation

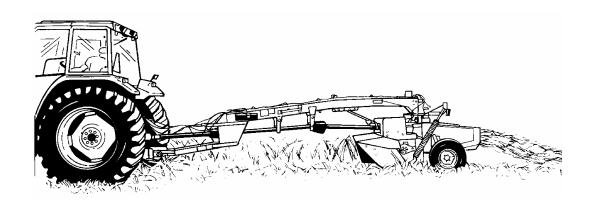
Use the tractor wiring diagram or, if necessary, use a test light to identify the tractor wires. Connect the wires to the socket as follows:

Pin	Connector ID	Attached To
1	White (WHT)	Ground wire, all lights
2	Black (BLK)	Not used
3	Yellow (YEL)	Left side amber light
4	Red (RED)	Brake lights
5	Green (GRN)	Right side amber light
6	Brown (BRN)	Taillights
7	Blue (BLU)	Not used



Standard **SAE J560** provides that the number **(4)** conductor (red wire) socket of the propelling vehicle is connected to the brake light circuit so that the brake lights activate when the brake pedal is depressed. Most tractors are wired to provide the brake light signal through the number **(4)** pin in the connector socket. Some model tractors do not provide this capability. On these tractors, the brake lights on trailing implements will not

Disc and Sickle Mower Conditioners Technical Training



Hydraulic

SECTION 35 - HYDRAULIC SYSTEM

Chapter 1 - Hydraulic Cylinders

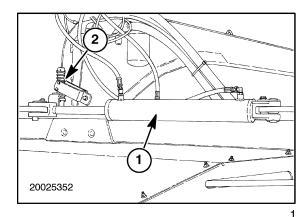
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INTRODUCTION

Four different cylinders are used on the Model 1475 trail frame to control the unit during operation.

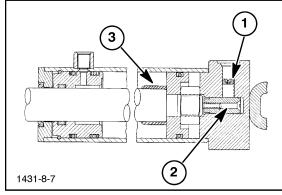
The tongue swing cylinder, 1, is a double-acting cylinder which pivots the tongue relative to the header and trail frame. A mechanical transport latch, 2, is used to prevent accidental actuation of the cylinder.



On Model 1475 below SN 637321, the tongue swing cylinder has a screw-in style orifice plate, 1, to control the speed of swing during use; the orifice is 2.36 mm (0.093") in diameter. In addition, the tongue swing cylinder has a metering pin, 2, and a metering sleeve, 3, to control the speed of the cylinder at the end of stroke.

When retracting, the cylinder moves at a speed controlled by the flow rate from the tractor and the orifice plate, until the metering pin, 2, enters a counterbore at the end of the cylinder barrel; this further restricts the flow of oil out of the cylinder, to "cushion" the end of stroke.

When extending, the cylinder moves at a speed controlled by the flow rate from the tractor and the orifice plate, until the metering sleeve, 3, enters a counterbore in the cylinder head; this further restricts the flow of oil out of the cylinder, to "cushion" the end of stroke.



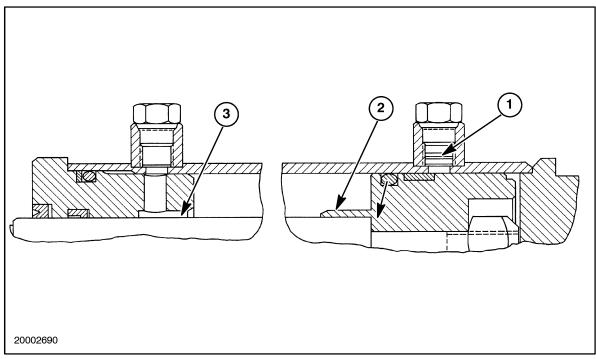
SECTION 35 - HYDRAULIC SYSTEM - CHAPTER 1

On Model 1475 SN637321 and above, the tongue swing cylinder has a screw-in style orifice plate, 1, to control the speed of swing during use; the orifice is 2.36 mm (0.093") in diameter. In addition, the tongue swing cylinder piston is tapered toward the barrel end to control the speed of the cylinder at the end of the stroke.

When retracting, the cylinder moves at a speed controlled by the flow rate from the tractor and the orifice plate. As the leading edge of the piston covers

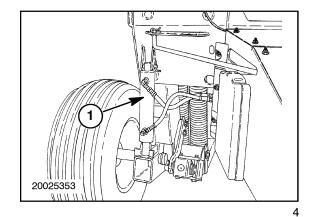
the barrel end port, the flow rate is reduced by the taper of the cylinder to "cushion" the end of the stroke. The piston will continue to move until it gently bottoms out in the cylinder bore.

When extending, the cylinder moves at a speed controlled by the flow rate from the tractor and the orifice plate. As the piston reaches the cylinder head, the metering sleeve, 2, enters a counterbore, 3, in the cylinder head; this further restricts the flow of oil out of the cylinder, to "cushion" the end of the stroke.

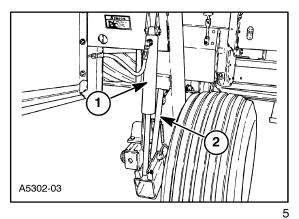


SECTION 35 - HYDRAULIC SYSTEM - CHAPTER 1

The left side lift cylinder, 1, is a master cylinder that supplies oil to the right side lift cylinder.

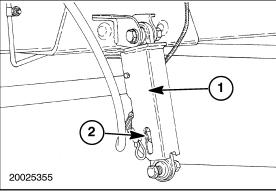


The right side lift cylinder, 1, operates as a slave cylinder. Mechanical transport stops, 2, are used to prevent accident lowering of the header.

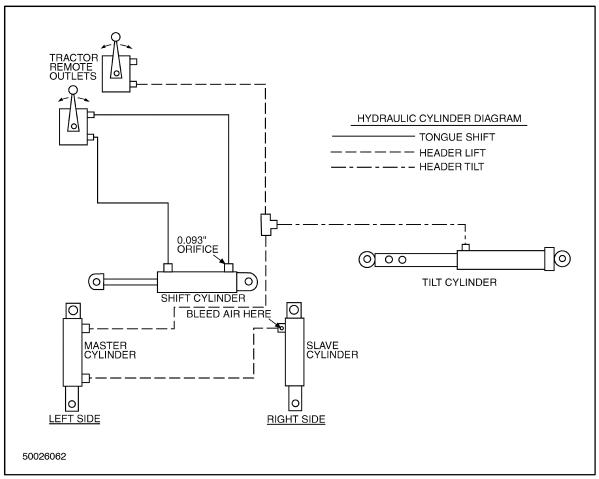


The header tilt cylinder, 1, is teed into the pressure line between the tractor and the master lift cylinder, and is a single-acting cylinder. The header tilt cylinder operates in sequence with the header lift cylinders, based on their relative pressure requirements.

When the unit is lowered, the header will drop until it rests on the ground, and the tilt cylinder will then extend to the position determined by the location of the pin, 2. When the header is raised, the header tilt cylinder will first retract, and the header will then raise.



HYDRAULIC CYLINDER DIAGRAM



WARNING A



Fluid under pressure can have sufficient force to penetrate the skin, causing serious personal injury. Always protect the skin and eyes from escaping fluid under pressure.

Before disconnecting lines or fittings, be sure to release all pressure by operating the tractor control valves. Before applying pressure to the system, be sure all connections are tight and that hoses and connections are not damaged.

If injured by escaping fluid, obtain medical assistance at once. Serious infection or reaction can develop if medical treatment is not administered immediately.

LIFT CYLINDERS

Bleeding Air From The Lift Cylinders

If the lift cylinders do not lift the frame evenly or if one side lifts higher than the other, rephase the cylinders by lowering the mower-conditioner and hold the tractor valve in the lower position for 10 to 15 seconds or by raising the mower-conditioner and hold the tractor valve for 10 to 15 seconds. If the cylinders do not extend far enough to release the transport stops, there may be air in the hydraulic system that must be purged.

Loosen the hose swivel fitting, 1, at the upper end of the slave cylinder.

NOTE: Use a shop rag or other shielding means for protection from seeping oil at loosened fittings.

With the tractor engine at a low idle, actuate the tractor hydraulic lever and extend the master lift cylinder until oil flow from the loosened fitting is free of air. Then tighten the fitting.

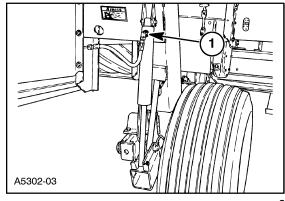
IMPORTANT: If the cylinders do not extend far enough to release the transport stops, air remains in the hydraulic system and must be purged. If the transport stop on the master cylinder side does not release, excessive oil may be in the slave cylinder circuit. Bleed this oil until both stop blocks are engaged on their respective transport stops.

Raise and lower the header several times until all air is purged from the system. Repeat the previous steps if necessary.

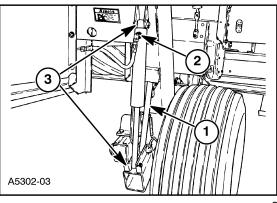
Removal

- Raise the header and engage the lift cylinder transport stops, 1.
- 2. Remove the hose(s), 2.
- 3. Remove the pins, 3, and remove the lift cylinder.

NOTE: Right side shown, left side similar.



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SECTION 35 - HYDRAULIC SYSTEM

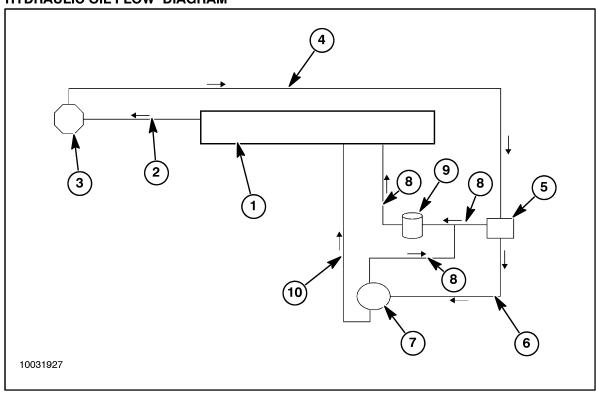
Chapter 2 - Hydraulic Header Drive System

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HYDRAULIC HEADER DRIVE SYSTEM

HYDRAULIC OIL FLOW DIAGRAM



- 1. Hydraulic reservoir (tongue weld assembly)
- 2. Suction line
- 3. Pump (540 or 1000 RPM)
- 4. Pressure line from pump to relief valve body
- 5. Relief valve body with relief valve

SPECIFICATIONS

Pump

- All 540 and 1000 RPM with gearboxes 110
 L- (29 GPM) at 540 RPM PTO speed
- All 1000 RPM Direct Drive without gearbox 114 L (30 GPM) at 1000 RPM PTO speed

Relief valve - 238 - 241 bar (3450 - 3500 PSI)

Motor Case Drain 2 - 3 GPM at zero pressure

System capacity - 105 L (28 gal.)

- 6. Pressure line from relief valve to header drive motor
- 7. Drive motor
- 8. Return lines
- 9. Filter
- 10. Case drain line

SPECIAL TOOLS

Pressure Gauge 345 bar (5000 PSI)

SAE #4 O-ring 7/16"-20 THD adapter to pressure gauge, test fitting (relief valve testing)

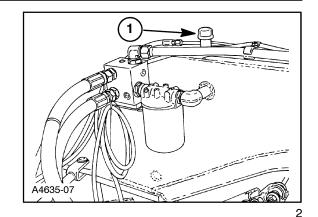
SAE #16 O-ring 1-5/16"-12 THD adapter to flow meter, test fitting (Pump flow testing)

Flow Meter

Motor Lock Tool #86503935

Before testing the hydraulic drive system, check the hydraulic reservoir oil level using dipstick, 1, and add oil if required.

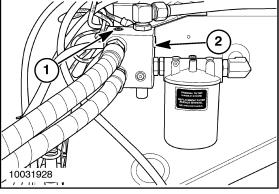
Before doing any hydraulic testing operate the unit to get the hydraulic oil to operating temperature. Running hydraulic test with cold oil will give false readings.



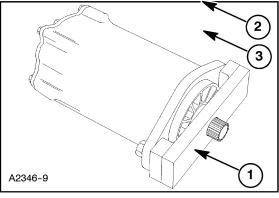
PRESSURE TESTING

- To check the header drive system pressure, remove plug, 1, from the T-P port located on the top of the valve body, 2.
- 2. Install a SAE O-ring 7/16"-20 fitting and attach a pressure gauge.
- 3. Remove the hydraulic drive motor from the header drive gearbox.
- Attach special tool #86503935, 1, to lock the drive motor. Slide the tool over the motor shaft and secure the tool to the motor flange as shown.
- 5. Operate the tractor PTO momentarily to obtain a pressure reading.
- If the pressure is not with-in 238 241 bar (3450 3500 PSI), replace the relief valve cartridge, 3.

NOTE: If the pressure was slow to obtain, further testing of the pump and motor is required.



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PUMP AND MOTOR TESTING

Motor Testing

If the relief valve is with-in specification, the problem may be in the pump or motor. To determine if the problem is in the pump or motor, test the motor case drain oil flow.

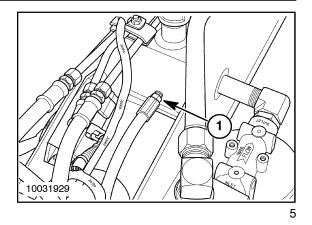
- 1. Remove the motor case drain line, 1, from the reservoir and install a flow meter in the line.
- Operate the tractor and check the case drain flow.
- 3. If the case drain oil flow is over 2 3 GPM at zero pressure, repair/replace the motor.
- If the case drain is less than allowed the problem is in the pump, replace the pump or test the pump output.

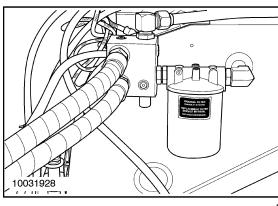


To test the pump install a flow meter into the pressure line from the relief valve block to the motor. Installing the flow meter at this location, the relief valve is still in the system for protection.

IMPORTANT: If the flow meter is installed after the pump, but before the relief valve CAUTION must be used because there is no relief valve protection at this point.

- Install a flow meter into the pressure line from the relief valve to the motor.
- 2. Operate the tractor PTO and take a reading.
 - All 540 and 1000 RPM with gearboxes 110
 L- (29 GPM) at 540 RPM PTO speed
 - All 1000 RPM Direct Drive without gearbox 114 L (30 GPM) at 1000 RPM PTO speed



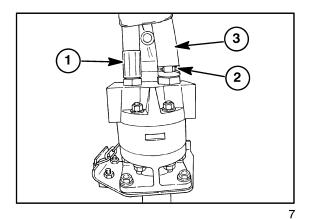


HEADER DRIVE PUMP

Sauer-Sundstrand

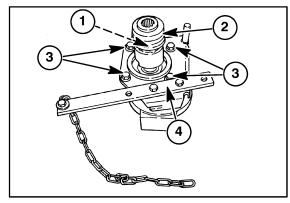
The only maintenance that can be performed on the Sauer-Sundstrand pumps is replacement of the shaft seal. Any major repair should be performed by an authorized Sauer-Sundstrand repair station. Work done by persons not authorized by Sauer-Sundstrand will void any warranty on the pump.

- 1. Disconnect and plug high pressure hose, 1.
- 2. Loosen hose clamp, 2, disconnect and plug return hose, 3.

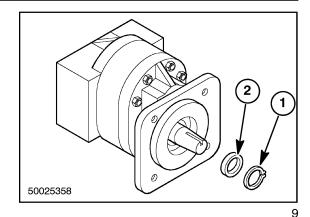


- 3. Remove the cap screw, 1, and remove the quick coupler, 2.
- 4. Remove the cap screws, 3, and remove the bracket, 4.

NOTE: The bracket is held in place with only two cap screws on Models BSN 625274.



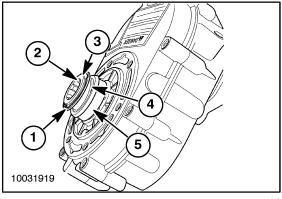
- 5. Plug the ports to prevent dirt and solvent from entering the pump housing. Thoroughly clean the outside of the pump housing.
- 6. Remove the snap ring, 1, from the housing and remove the seal, 2. The seal will be damaged upon removal.
- 7. Install a new seal, 2, and snap ring, 1.



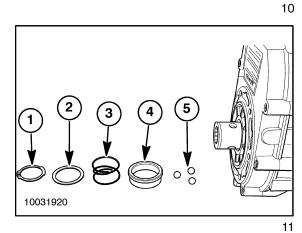
PTO DETENT LOCK

Disassembly

1. Remove snap ring, 1, from shaft, 2, detent washer, 3, spring, 4. When removing detent cam, 5, use caution, three detent balls will be exposed and may drop out.



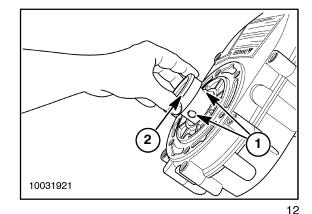
The PTO detent lock shown disassembled.



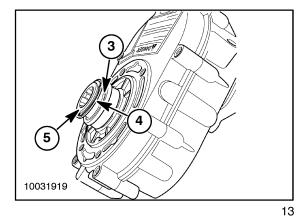
- 1. Snap ring 2. Detent washer
- 3. Spring
- 4. Detent cam
- 5. Detent balls (3)

Assembly

 Lubricate the detent balls, 1, with grease and place in the detent holes in the shaft and slide the detent cam, 2, on the shaft over the detent balls to hold the detent balls in place.



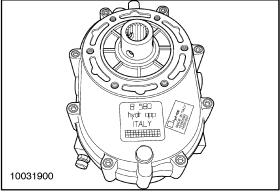
Install spring, 3, detent washer, 4, over shaft and install snap ring, 5, in shaft groove.



GEARBOX

The 1475 mower-conditioner trail frame is equipped with a 540 RPM or 1000 RPM drive. All 540-RPM units use a step-up gearbox drive. All 1000-RPM units below serial number #625270 also use a step-up gearbox. All 1000 RPM units above serial number #625271 is equipped with a direct drive 1000 RPM hydraulic drive pump which eliminates the use of the step-up gearbox.

The only difference between the 540-RPM and the 1000-RPM is the gear sets, input drive shaft, and gearbox oil level dipstick.



Pump and Gearbox Orientation

The pump and gearbox orientation may be changed to obtain clearance for the step-up gearbox and the tractor drawbar and supports by relocating and using the proper oil level dipstick.

Pump and gearbox orientation will be the location of the pump-mounting flange, 1, up or down. The gearbox has two drain/fill locations, 2, and two dipstick/breather locations, 3.

IMPORTANT: The correct dipstick must be used in the proper location or gearbox damage will occur. Refer to the following chart for the proper dipstick.

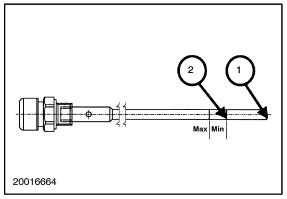
IMPORTANT: The gearbox oil level must be checked in the position that the gearbox will be operated. DO NOT overfill the gearbox or damage will result.

1 2 3 10031901

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Dipstick Length

Gearbox Orientation 540 RPM	Dipstick Part Number	Distance from end of dipstick, 1, to "min" mark, 2.
Gearbox with pump mount flange down	86531472	72 mm (2-3/16")
Gearbox with pump mount flange up	86531470	40 mm (1-9/16")
Gearbox Orientation 1000 RPM		
Gearbox with pump mount flange down	86531471	38 mm (1.5")
Gearbox with pump mount flange up	86531469	21 mm (13/16")



MOUNTING PUMP ON THE PTO SHAFT



CAUTION A



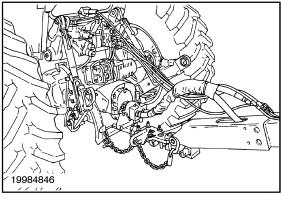
Failure to use the drawbar extension or tractor with ASAE standard PTO-to-hitch dimensions can cause damage to the pump unit and hoses.

540 RPM PTO UNITS

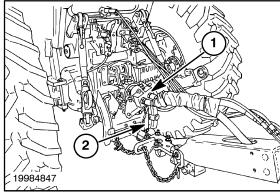
The 540 RPM PTO gearbox and pump assembly may be installed on the tractor with the gearbox input shaft in the top position and the pump in the bottom position (pump down) or with the pump in the top position and the gearbox input shaft in the bottom position (pump up) as required to achieve the proper attachment. The gearbox will operate acceptably in either position.

IMPORTANT: Coat the tractor PTO splines and splines in the pump gearbox with grease. Slide the pump, 1, all the way onto the PTO shaft, until the slide collar is fully engaged.

IMPORTANT: The torque arm, 2, must be against the right side of the drawbar to keep the pump from rotating. Move the torque arm up on the pump plate to prevent dragging in the windrows. Always loop the chain around the drawbar and secure the chain in the keyhole slot in the pump plate.



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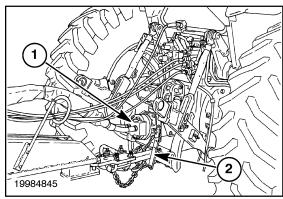


1000 RPM PTO UNITS

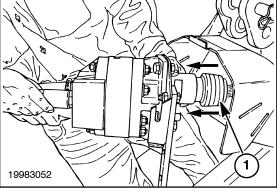
IMPORTANT: Coat the tractor PTO splines and splines in the pump, 1, all the way onto the PTO shaft, until the slide collar is fully engaged.

IMPORTANT: The torque arm, 2, must be against the right side of the drawbar to keep the pump from rotating. Move the torque arm up on the pump plate to prevent dragging in the windrows. Always loop the chain around the drawbar and secure the chain in the keyhole slot in the pump plate.

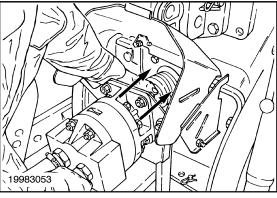
The 1000 RPM direct drive pump attaches to the tractor by pulling back on the ring at the end of the PTO pump coupler, 1. The ring will snap into place, remaining retracted.



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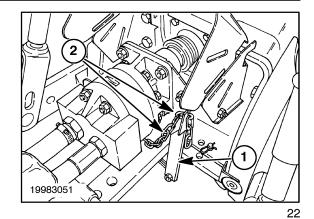
Push the pump onto the shaft. When the pump is on the shaft, the retaining ring will return to the forward position. Continue to push the pump onto the PTO shaft until it is fully seated. The pump should not slide off the PTO shaft without pulling back on the retaining ring.

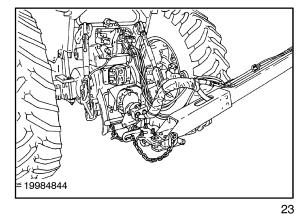


With the pump in place, the torque arm should extend below the drawbar, 1, preventing the pump from turning with the PTO shaft. Adjust the torque arm as needed by moving it up and down along the mounting holes provided. Tighten the bolts to the appropriate torque at this time. Secure the chain around the drawbar and hook it into the mounting bracket, 2.

IMPORTANT: Make certain the torque arm does not contact the tractor drawbar support when the pump is locked onto the tractor PTO. Binding or end loading the PTO guide coupler may cause a premature coupler fracture.

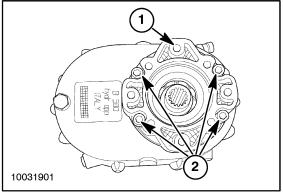
To prevent damage to the hydraulic hoses, turn the tractor and tongue to the extreme left and right positions. At each extreme position, check the hoses to be sure they are not pinched or binding. Remove twists from the hoses, then tighten hose connections securely.



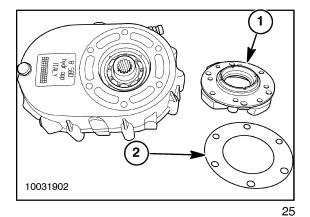


Disassembly

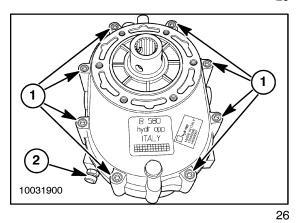
- Before starting disassembly, mark the two gearbox halves and the dipstick location to aid in proper assembly, pump and dipstick orientation.
- 2. Remove the hydraulic drive pump from the pump mounting flange, 1, if removed with the gearbox.
- 3. Remove the four M12 x 70 mm socket head cap screws and sealing washers, 2.



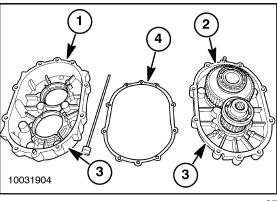
4. Remove the mounting plate flange, 1, and gasket, 2.



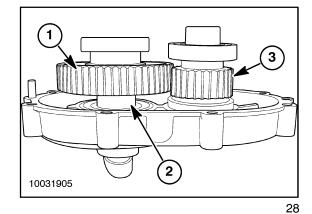
- 5. Remove the eight M8 x 35 mm socket head cap screws and sealing washers, 1.
- 6. Remove dipstick, 2, from the housing.



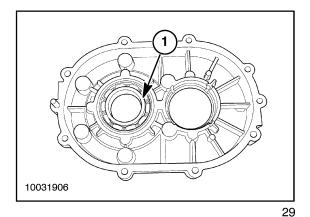
- 7. Using a pry bar separate the gearbox halves, 1 and 2. Use caution not the damage the flat surface, 3, on the housings.
- 8. Remove gasket, 4.



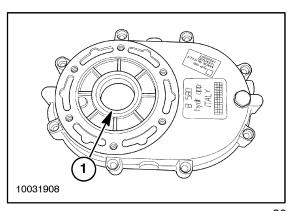
- 9. Use a pry bar to raise the large gear and shaft assembly, 1, up about one inch at 2.
- 10. Remove the small gear and shaft assembly, 3, from the gearbox housing.
- 11. Remove the large gear, 1, from the housing.



12. Remove bearing, 1, from the housing by pressing on the bearing from the seal side, top of housing.

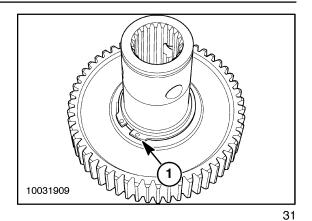


13. Remove seal, 1, from the housing by pressing it down into the center of the housing.

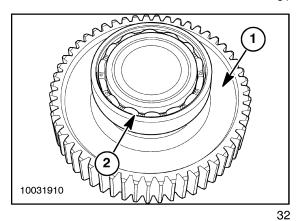


Large Gear Shaft Disassembly

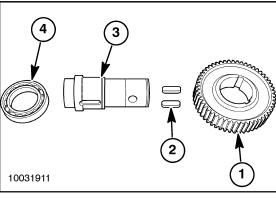
1. Remove snap ring, 1.



- 2. Support the shaft and press gear, 1, from the
- 3. Support bearing, 2, and press the shaft from the bearing.
- 4. Remove the two keys from the shaft.

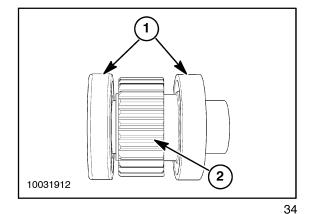


Large gear, 1, keys, 2, shaft, 3, bearing, 4. Shown disassembled.

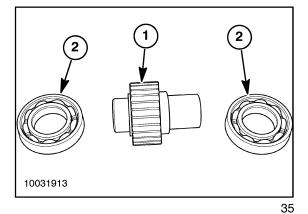


Small Gear Shaft Disassembly

1. Press both bearings, 1, from the shaft and gear assembly, 2, by supporting the bearings and pressing the shaft from the bearings.

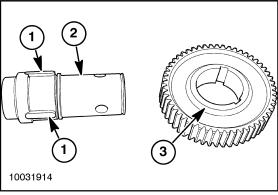


2. Small gear shaft assembly, 1, and bearings, 2, shown separated.

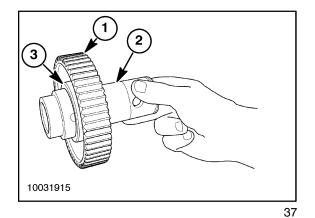


Assembly

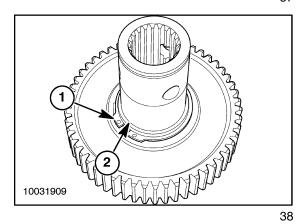
1. Insert both keys, 1, into the grooves in shaft, 2, place large gear, 3, over shaft and align the key ways with keys in shaft.



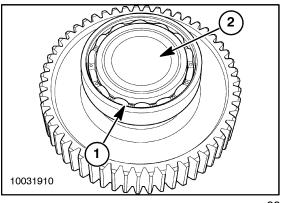
2. With the gear key ways and keys aligned, press gear, 1, on shaft, 2, until the gear seats against the shoulder on the shaft at 3.



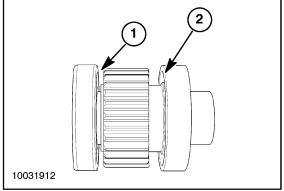
3. Install snap ring, 1, making sure the snap ring is fully seated in the groove, 2.



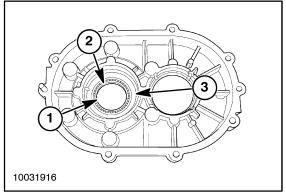
4. Press bearing, 1, onto the shaft, 2, and making sure the bearing is seated against the shoulder on the shaft.



5. Press bearings, 1 and 2, until properly seated on the shaft.



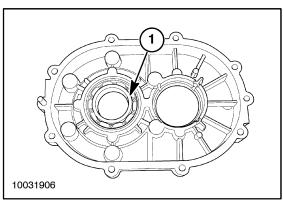
6. Install seal, 1, with the open side, 2, towards the center of the housing, 3. Fully seat the seal into the housing.



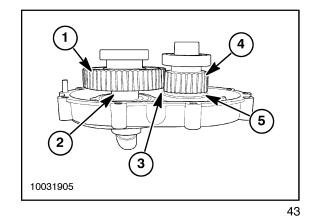
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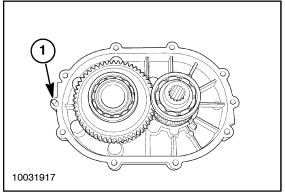
7. Press and fully seat bearing, 1, into the housing making sure the bearing is straight in housing or damage to the housing may occur.



- 8. Insert the shaft with the large gear, 1, into housing, 2, allowing enough clearance at 3, to install the small gear and shaft assembly, 4.
- Insert the small shaft and bearing assembly, 4, into the housing at 5, properly meshing the small gear with the large gear.
- 10. Complete installation of both shaft assemblies into the housing.

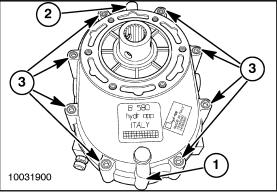


11. Place the gasket over dowel pin,1, and align with other housing bolt holes.

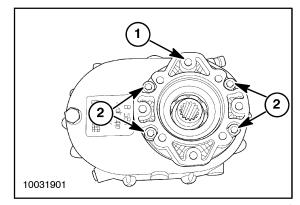


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- 12. Place the gearbox housing over dowel pin, 1, and align dowel pin, 2, with bottom housing and slide the top housing onto the bottom housing.
- 13. Install the eight M8 x 35 mm socket head cap screws and sealing washers, 3. Torque the cap screws to 17 21 Nm (12.5 15.5 ft. lbs). Do not over tighten the cap screws, damage to the housing may occur.

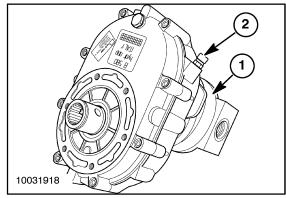


14. Install pump flange, 1, with the gasket between the flange and the gearbox housing. Use four M12 x 70 mm socket head cap screws and sealing washers, 2. Torque the cap screws to 55 – 65 Nm (40.6 – 47.9 ft. lbs.). Do not over tighten the cap screws, damage to the housing may occur.



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- 15. Attach the hydraulic pump, 1, if removed with the gearbox, using a gasket between the pump the housing, using two M12 x 30 mm cap screws and hardened flat washers.
- 16. Gearbox and pump orientation shown with the pump in the "UP" position.
- 17. Position the gearbox/pump assembly as it will be installed on the tractor PTO and fill the gearbox with SAE 80W-90 GL5 gear oil to the proper level on the dipstick.
- 18. Install dipstick, 2.

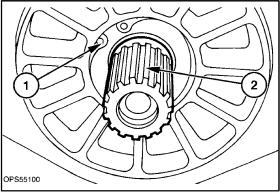


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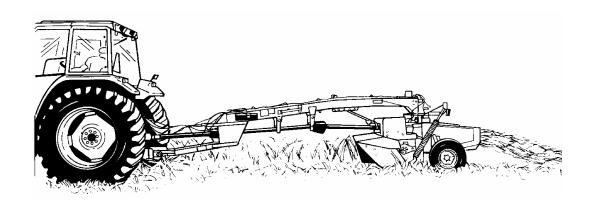
HYDRAULIC HEADER DRIVE MOTOR - Below SN 672658

Disassembly

- Thoroughly clean the outside of the motor housing before disassembly. Plug the ports to prevent dirt and solvent from entering the motor housing.
- 2. Remove the snap ring, 1, from the housing, and remove the seal, 2; the seal will be damaged upon removal.



Disc and Sickle Mower Conditioners Technical Training



Troubleshooting & Miscellaneous

CROP PROCESSING - Troubleshooting

Problem	Possible Cause	Correction
Leaves damaged or stripped off stems.	Too much pressure on the rolls.	Reduce the pressure until the leaves are not damaged.
Leaving ragged or long stubble.	Ground speed too fast.	Reduce the ground speed.
	Dull, bent, or broken knives.	Turn over or replace the knives.
	Knives installed on wrong discs.	Install knives on correct discs.
	PTO speed too slow.	Maintain rpm on the tractor PTO. (Do not overspeed.)
	Cutting too high.	Remove high stubble kit, if installed. Increase header tilt.
	Header flotation too light.	Increase the header weight to keep the header in better ground contact.
	Wheel arm linkage binding.	Remove, clean and lubricate wheel arm pin.
Excessive breakage of the knives.	Cutting too low in stony conditions.	Raise the cutting height with header tilt. Install high stubble kit.
		Adjust the flotation springs to float the header with 45.4 kg (100 lb) force, per side.
	Ground speed too high in stony conditions.	Reduce ground speed.
Not cutting short enough in down material.	Ground speed too fast.	Reduce ground speed.
	Broken, bent, or dull knives.	Replace the knives or turn over the knives.
	Cutting height too	Lower the cutting height by

Problem	Possible Cause	Correction
	high.	tilting the header.
	Tractor PTO speed too slow.	Maintain tractor PTO rpm. (Do not overspeed.)
Strip of run-down, uncut material.	Ground speed too fast.	Use slower ground speed.
	Crowding of the uncut material.	Do not crowd the uncut material.
	Missing or dull knives.	Replace or turn over the knives.
		Clean off cutter bar. Tilt cutter bar back towards horizontal to reduce material buildup.
Forming poor or bunchy windrow.	Tractor PTO speed too slow.	Maintain rpm on the tractor PTO. (Do not overspeed.)
	Incorrect swath gate adjustment.	Adjust the swath gate to even discharge flow.
	Incorrect windrow shield adjustment.	Adjust the windrow shields.
Pulling material out of the ground when cutting back swath or tall material is leaning into the machine. Excessive power requirements.	Excessive roll pressure.	Reduce roll pressure or increase roll clearance.
	Ground speed too slow.	Ground speed too slow.
Soil buildup on front of cutter bar.	Very wet crop conditions.	Adjust flotation springs to reduce header flotation weight.
		Raise the cutting height with header tilt.
		Install high stubble kit.
Crop stems not scuffed. (Flail conditioner model only)	Under conditioning.	Lower rotor hood or install dimpled hood liner and high speed rotor.
Cutter bar does not turn easily by hand.	Buildup of dirt or twine under discs.	Remove disc and disc hub if necessary to clear debris.
Module oil level low.	Top cap seal failure from melted twine.	Remove twine and replace top cap seal.
	Seal failure on input shaft.	Replace seal.

CROP PROCESSING - Poor cutting

Symptom	Possible Cause	Test Reference / Action
Leaves damaged or stripped off stems.	· '	Reduce the pressure until the leaves are not damaged.

CROP PROCESSING - Poor cutting

Symptom	Possible Cause	Test Reference / Action

Leaving ragged or long stubble.	Ground speed too fast.	Reduce the ground speed.
	Dull, bent, or broken knives.	Turn over or replace the knives.
	Knives installed on wrong discs.	Install knives on correct discs.
	PTO speed too slow.	Maintain rpm on the tractor PTO. (Do not overspeed.)
	Cutting too high.	Remove high stubble kit, if installed. Increase header tilt.
	Header flotation too light.	Increase the header weight to keep the header in better ground contact.
	Wheel arm linkage binding.	Remove, clean and lubricate wheel arm pin.

CROP PROCESSING - Feeding problem

Symptom	Possible Cause	Test Reference / Action
Excessive breakage of the knives.	Cutting too low in stony conditions.	Raise the cutting height with header tilt. Install high stubble kit.
		Adjust the flotation springs to float the header with 45.4 kg (100 lb) force, per side.
	Ground speed too high in stony conditions.	Reduce ground speed.

CROP PROCESSING - Poor cutting

Symptom	Possible Cause	Test Reference / Action
Not cutting short enough in down material.	Ground speed too fast.	Reduce ground speed.
	Broken, bent, or dull knives.	Replace the knives or turn over the knives.
	Cutting height too high.	Lower the cutting height by tilting the header.
	Tractor PTO speed too slow.	Maintain tractor PTO rpm. (Do not overspeed.)

CROP PROCESSING - Poor cutting

Symptom	Possible Cause	Test Reference / Action
Strip of run-down, uncut material.	Ground speed too fast.	Use slower ground speed.
	Crowding of the uncut material.	Do not crowd the uncut material.
	Missing or dull knives.	Replace or turn over the knives.
		Clean off cutter bar. Tilt cutter bar back towards horizontal to reduce material buildup.

CROP PROCESSING - Excessive return

Symptom	Possible Cause	Test Reference / Action
- 7p.co		1 000 1101 01100 / 71011011

Forming poor or bunchy windrow.	·	Maintain rpm on the tractor PTO. (Do not overspeed.)
	Incorrect swath gate adjustment.	Adjust the swath gate to even discharge flow.
	Incorrect windrow shield adjustment.	Adjust the windrow shields.

CROP PROCESSING - Poor cutting

Symptom	Possible Cause	Test Reference / Action
Pulling material out of the ground when cutting back swath or tall material is leaning into the machine. Excessive power requirements.		Reduce roll pressure or increase roll clearance.
	Ground speed too slow.	Ground speed too slow.

CROP PROCESSING - Poor cutting

Symptom	Possible Cause	Test Reference / Action
Soil buildup on front of cutter bar.	Very wet crop conditions.	Adjust flotation springs to reduce header flotation weight.
		Raise the cutting height with header tilt.
		Install high stubble kit.

CROP PROCESSING - Poor cutting

Symptom	Possible Cause	Test Reference / Action
		Lower rotor hood or install dimpled hood liner and high speed rotor.

CROP PROCESSING - Hard to operate

Symptom	Possible Cause	Test Reference / Action
Cutter bar does not turn	Buildup of dirt or twine	Remove disc and disc hub if necessary
easily by hand.	under discs.	to clear debris.

CROP PROCESSING - Low fluid level

Symptom	Possible Cause	Test Reference / Action
Module oil level low.	Top cap seal failure from melted twine.	Remove twine and replace top cap seal.
	Seal failure on input shaft.	Replace seal.

Option 2

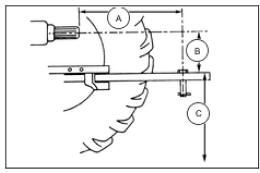
Some newer tractors may be equipped with drawbars that can be adjusted to a distance of 609 mm (24 in) dimension (A) from the end of the tractor PTO shaft to the center of the drawbar hole. In this case, the disc mower-conditioner tongue may be connected directly to the tractor drawbar. NOTICE: Using a tractor with an incorrect PTO-to-

hitch dimension can damage the front PTO and/or the tractor PTO drive line.

Ideally the top of the tractor drawbar should be 203 - 305 mm (8 - 12 in) dimension (B) below the tractor PTO shaft. A drawbar positioned too low or high will affect the drive line angle, and may cause the PTO drive shaft to bottom out or pull apart in some conditions. Locate the drawbar directly below the PTO shaft. Clamp the drawbar so it cannot be moved from side to side.

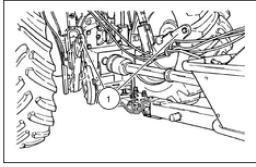
The drawbar height above the ground dimension (C) should be 330 - 508 mm (13 - 20 in) for tractors up to 125 Hp, and 381 - 559 mm (15 -22 in) for tractors from 125 Hp to 160 Hp.

NOTICE: If the tractor has a three-point hitch, adjust the lower links (1) either as high as possible or as low as possible, or remove them, to prevent them from hitting the tongue and PTO shaft when turning.



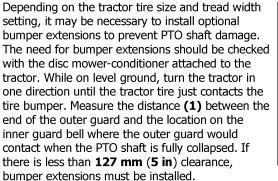
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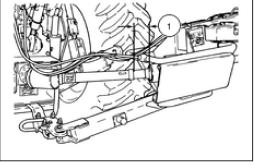


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NOTICE: Watch the PTO guards while turning the tractor. Stop turning the tractor if the guards will bottom out to prevent damage to the PTO shaft. Always check the PTO shaft guard clearance the first time the disc mower-conditioner is connected to a different tractor, to prevent possible PTO shaft



97-1532N 6 🛅



damage.

The tractor may be checked by itself to determine if bumper extensions may be necessary. After adjusting the drawbar to the required 610 mm (24 in) length (1), measure the distance from the rear of the tractor tires to the center of the hitch point (2). If this distance measures 305 mm (12 in) or greater; bumper extensions will be required. Check the PTO shaft quard clearance with the disc mower-conditioner attached to verify if bumper extensions are necessary.

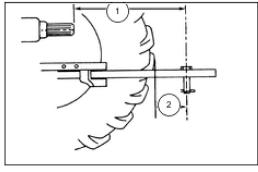
NOTICE: The primary PTO **80 °C** CV joint may be damaged if bumper extensions are not installed on the disc mower-conditioner for tractors with drawbars extending 305 mm (12 in) or greater behind the tires.

Bumper extensions (standard tongue)

Bumper extensions (1) are required to limit the turn angle between the tractor and the pivot tongue disc mower-conditioner on tractors where the drawbar extends more than **305 mm** (**12 in**) behind the rear tractor tires (when set at 610 mm (24 in) from end of tractor PTO shaft), to prevent bottoming out the primary PTO 80 °C CV joint causing failure.

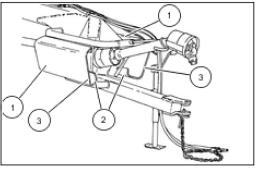
Install the bumper extensions by positioning them with the angled end (2) forward, and centered on the existing bumper frame. Secure the bumper extensions using the 5/8 in x 1 1/4 in bolts. washers and nuts supplied; torque the hardware to 190 N·m (140 lb ft).

After installation, attach the tractor to the unit, and turn the tractor sharply until the rear tractor tire is close to the bumper extension. If the tractor tire will contact the forward edge (3) of the bumper extension, reposition the bumper extensions to the forward position to prevent possible damage to the tractor tires.



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4896-03N 8

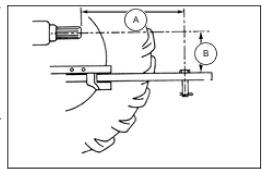


Attaching disc mower-conditioner to tractor with drawbar extension (standard tongue only)

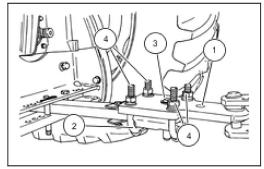
NOTICE: Attach the drawbar extension solidly to the tractor drawbar, and clamp the drawbar securely to limit side to side movement. Pivoting the tongue will put heavy side loads on the tractor drawbar.

NOTICE: The drawbar MUST BE positioned to **610 mm** (**24 in**) (**A**) to allow for sharp turns and to prevent damage to the primary PTO shaft. Extend the drawbar or install the drawbar extension to obtain this dimension.

NOTE: Measure from the top of the drawbar to the center of the PTO shaft. Install the extension on the top or bottom of the drawbar as required so that the top of the drawbar extension is 203 - 305 mm (8 - 12 in) (B) from the PTO shaft centerline. Install the drawbar extension (1) and clamp (2) on the drawbar. Install the drilled pin (3) down through the FRONT hole in the extension and the rear hole in the drawbar. Install hairpin cotter, as close as possible to the bottom of the drawbar. Tighten the 5/8 in nuts (4) evenly to 190 N·m (140 lb ft) torque.



20106227NN 9



1431-2-57N 10

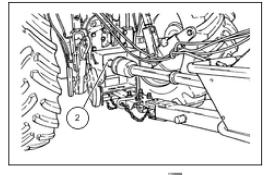
Installing PTO on standard tongue

Attach the PTO by pulling back on the slide collar (2), and slide the PTO forward on the tractor shaft until the pins engage in the tractor PTO shaft groove. The collar will slide forward automatically locking the PTO shaft onto the tractor shaft.

NOTE: The yoke where the collar slides must be free of paint and rust and must be kept lubricated with oil for the collar to slide freely.

NOTICE: Models with standard tongue only: The tractor end of the primary PTO shaft has a CV joint which is heavy. Be careful when handling it, dropping it could cause personal injury and damage the CV joint.

Check to make sure the PTO is locked on the tractor shaft. To remove, pull back on the collar to unlock the pins and remove the PTO.

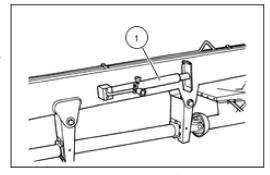


1431-2-02RN 11

Jack assembly (standard tongue)

After attaching the disc mower-conditioner to the tractor, retract the jack by turning the hand crank counterclockwise. Pull the pin and remove the jack. Store the jack (1) on the side of the tongue. Secure the jack with the pin.

NOTE: To prevent the jack from unwinding during use, loop the chain around the handle before inserting the pin.



1431-1-29N 12

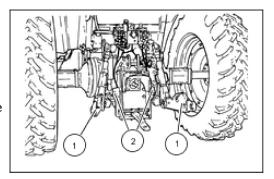
Preparing the tractor and disc mower conditioner (2- point swivel hitch tongue)

The swivel hitch pivot tongue for the disc mower-conditioner requires that the tractor's three-point hitch be properly adjusted for correct operation. Prior to attaching the disc mower-conditioner to the tractor, ensure that the lower lift arms (1) are leveled side to side, are not free to float vertically, and are secured against side to side movement. Adjust the sway blocks (2), check chains or stabilizer links to provide a minimum lift arm spacing of 826 mm (32 - ½ in) for Category 2 or 3N hitches, or 965 mm (38 in) for Category 3 hitches. Slide the drawbar in to its retracted position, or remove it from the tractor to avoid possible interference with the disc mower-conditioner PTO shaft.

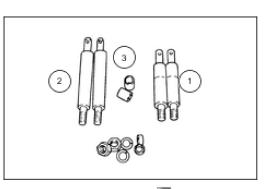
The swivel hitch pivot tongue disc mower-conditioner is shipped with a set of lift pins. The shorter pins (1) are used on the disc mower-conditioner for tractors equipped with Category 2 or 3N hitches, the optional longer pins (2) are used with Category 3 hitches. Bushings (3) for use with Category 3 & 3N hitches, are also supplied.

NOTE: If the disc mower-conditioner is equipped with a Category 3 or 3N hitch, the longer pins are available from your authorized dealer parts department.

If the disc mower-conditioner is to be used with a quick hitch, it will be necessary to purchase a quick hitch bushing kit. This kit is available from your dealer's parts department.



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97-1534N 14 🔠

In order to ensure a sufficient amount of PTO shaft overlap on a wide variety of tractor hitches, the disc mower-conditioner is equipped with two pin mounting positions. To determine the correct pin position, it is necessary to measure the distance between the end of the tractor PTO shaft (1) and the lower link ends, with the lower links positioned level.

NOTE: If using a quick hitch, measure from the end of the tractor PTO shaft to the lifting points on the quick hitch, with the lower links positioned level.

If the distance is less than **635 mm** (**25 in**), the appropriate lift pins should be installed in the forward holes (**1**) in the hitch. If the distance is **635 mm** (**25 in**) or greater, install the appropriate pins in the rear holes (**2**) in the hitch.

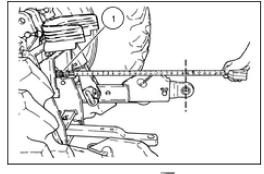
NOTICE: Failure to install the lift pins in the correct position could result in failure of the disc mower-conditioner PTO shaft.

Install the pins in the hitch, and install the spacer and check chain plate (1) on the pin. Secure the pin and check chain using a 1 in nut (2), lock washer and hardened flat washer. Tighten securely

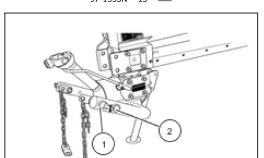
NOTICE: Only install one set of pins. Damage to the hitch could occur if both long and short pins are

to 544 N·m (401 lb ft).

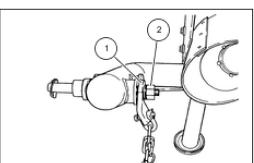
installed.

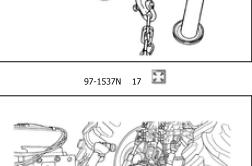


97-1535N 15



19985198N 16

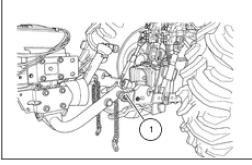




Attaching the disc mower conditioner to the tractor (2-point swivel hitch tongue)

Back the tractor up to the unit. Attach the lower lift arms (1) to the pins on the swivel hitch. If the disc mower-conditioner is equipped with a Category 3 or 3N hitch, the longer pins are available from your authorized dealer parts department.

NOTE: If the disc mower-conditioner is equipped with a Category 3 or 3N hitch, the longer pins are available from your authorized dealer parts department.



19985199N 18

Attach the PTO shaft by pulling back the locking collar (1). Slide the PTO shaft forward onto the tractor shaft until the pins engage in the tractor PTO shaft groove when the collar is released.

NOTE: The yoke where the collar slides must be free of paint and rust and must be kept lubricated with oil for the collar to slide freely.

Check to make sure the PTO shaft is locked on the tractor shaft by trying to slide it on the shaft. To remove, pull back on the collar to unlock the pins and remove the PTO shaft.

The swivel hitch and PTO shaft are designed to fit the majority of tractors with no danger of bottoming out if the lower lift arms are in advertently raised, provided that the swivel hitch lift pins are installed in the correct position. After attaching to the disc mower-conditioner with a tractor for the first time, slowly raise the lower lift arms to make sure the implement PTO shaft does not bottom out. If the PTO shaft will bottom out, refer to the tractor operator's manual for information on how to limit the up travel of the three point hitch, to prevent damage to the PTO shaft.

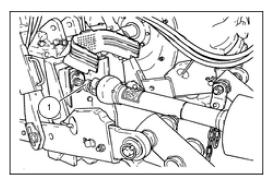
NOTICE: Failure to limit the up travel of the three point hitch could result in damage to the primary PTO drive shaft and tractor.

Attach the check chains **(1)** to the top link mounting position on the tractor, using the tractor top link mounting pin.

Raise the tractor three-point hitch until the disc mower-conditioner PTO shaft (2) is level. Adjust the check chains as short as possible with the hitch in this position.

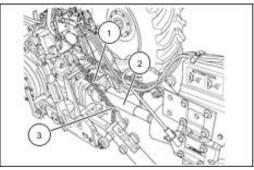
Excess chain **(3)** should be at the implement lift pins to prevent possible damage to tractor shielding and PTO. The check chains are not intended to carry the weight of the tongue but to prevent in advertent lowering of the hitch which could result in the PTO shaft being pulled apart. The check chains should become tight, preventing lowering the hitch more than **25 - 102 mm (1 - 4 in)** from the PTO shaft level position.

NOTICE: Failure to properly use the check chains could result in the pulling apart of the primary PTO drive shaft. This could result in damage to the drive shaft and tractor.



97-1539RN 19





19985200N 20



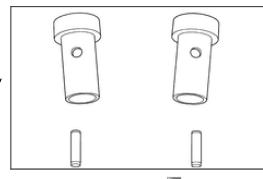
Preparing the swivel hitch tongue disc mower conditioner and tractors with a quick hitch

If the disc mower-conditioner is going to be used on a tractor with a Category 2, 3N, or 3 quick hitch, it will be necessary to purchase a quick hitch bushing kit, available from your authorized dealer parts department. The quick hitch bushing kit is to be used with the optional longer pins.

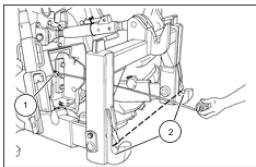
NOTE: The optional longer pins are available from your authorized dealer parts department.

Refer to the specifications section of this manual for the quick hitch bushing kit part number.

In order to ensure a sufficient amount of PTO shaft overlap on a wide variety of tractor hitches, the disc mower-conditioner is equipped with two pin mounting positions. To determine the correct pin position, it is necessary to measure the distance between the end of the tractor PTO shaft (1) and the lifting points on the quick hitch (2) with the lower links positioned level.



19996747N 21

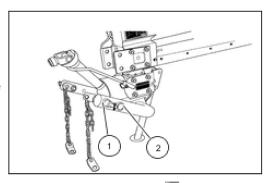


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If the distance is less than **635 mm (25 in)**, the appropriate lift pins should be installed in the forward holes **(1)** in the hitch. If the distance is **635 mm (25 in)** or greater, install the appropriate pins in the rear holes **(2)** in the hitch. In most cases, using a quick hitch will require the pins to be installed in the rear hole location. Always measure to be sure.

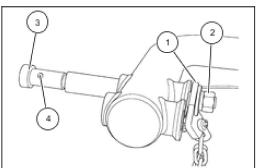
NOTICE: Failure to install the lift pins in the correct position could result in failure of the disc mower-conditioner PTO shaft.





Install the pins in the hitch and install the spacer and check chain plate (1) on the pin. Secure the pin and check chain using a 1 in nut (2), lock washer, and hardened flat washer. Tighten securely to 544 N·m (401 lb ft). Install the quick hitch bushings (3) onto the lift pins and retain with the pins (4) included in the bushing kit.

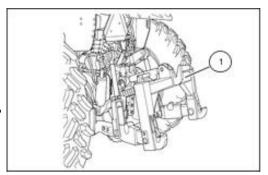
NOTICE: Only install one set of pins. Damage to the hitch could occur if both long and short pins are installed.



19996749N 24

The quick hitch (1) should be leaning toward the tractor. This can be accomplished by adjusting the top link of the tractor to the shortest position. This will prevent the upper portion of the quick hitch from contacting the tongue of the disc mowerconditioner during sharp turns and when traveling over uneven terrain.

NOTE: Failure to adjust the quick hitch towards the tractor may cause damage to the tongue of the disc mower-conditioner.



19996752N 25

Attaching the swivel hitch tongue disc mower-conditioner to the tractor with a quick hitch

Remove the primary PTO (1) from the disc mowerconditioner and place the PTO on the ground in a safe location away from the tractor or the front of the hitch. Remove the PTO support (2) from the hitch to prevent the PTO and PTO support from interfering with the guick hitch. Install the support upside down with the support facing the rear of the header. Reinstall the snap pin (3) to secure the PTO support into the hitch.

NOTICE: Failure to remove the PTO and reverse the PTO support may cause them to contact the quick hitch and damage the PTO and/or the PTO

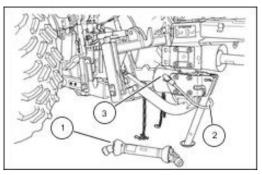
Back the tractor up to the unit. Attach the lift pins on the hitch of the disc mower-conditioner to the quick hitch. Lock the quick hitch over the lift pins to be sure that the pins are captured in the quick hitch.

Attach the PTO shaft by pulling back the locking collar (1) and slide the PTO shaft forward onto the tractor shaft until the pins engage in the tractor PTO shaft groove when the collar is released.

NOTE: The yoke where the collar slides must be free of paint and rust and must be kept lubricated with oil for the collar to slide freely.

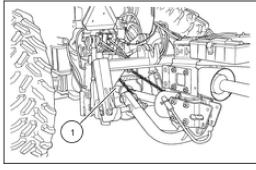
Check to make sure the PTO shaft is locked on the tractor shaft by trying to slide it on the shaft. To remove, pull back on the collar to unlock the pins and remove the PTO shaft.

The swivel hitch and PTO shaft are designed to fit the majority of tractors with no danger of bottoming out if the lower lift arms are inadvertently raised, provided that the swivel hitch lift pins are installed in the correct position. After attaching the disc mower-conditioner to a tractor for the first time, slowly raise the lower lift arms to make sure the implement PTO shaft does not



19986750N 26





19996751N 27



bottom out. If the PTO shaft will bottom out, refer to the tractor operator's manual for information on how to limit the up travel of the quick hitch to prevent damage to the PTO shaft.

NOTICE: Failure to limit the up travel of the quick hitch could result in damage to the primary PTO drive shaft and tractor.

Attach the check chain plates of the disc mower-conditioner hitch to the top link mounting pin on the tractor. The top link bolt (1) on the tractor may need to be replaced with a longer bolt to properly attach the check chain plates.

Attach the check chains (2) to the top link mounting position on the tractor using the tractor top link mounting pin (1).

Raise the tractor three-point hitch until the disc mower-conditioner PTO shaft (3) is level. Adjust the check chains as short as possible with the hitch in this position.

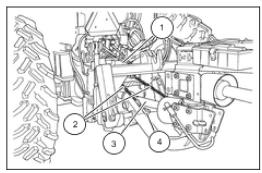
Excess chain should be at the implement lift pins (4) to prevent possible damage to the tractor shielding and PTO. The check chains are not intended to carry the weight of the tongue, but to prevent inadvertent lowering of the hitch, which could result in the PTO shaft being pulled apart.

The check chains should become tight when the lift arms are lowered, preventing lowering the hitch more than **25 - 102 mm** (**1 - 4 in**) from the PTO shaft level position.

NOTICE: Failure to properly use the check chains could result in the pulling apart of the primary PTO drive shaft. This could result in damage to the drive shaft and tractor.

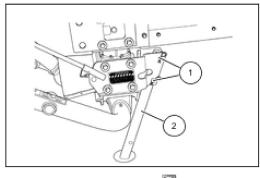
Jack stand (2-point swivel hitch tongue)

After attaching the disc mower-conditioner to the tractor, raise the jack stand off the ground by raising the tractor three-point hitch. Remove the two pins (1) and remove the jack stand (2).



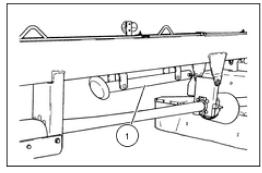
19996751N 28





19985201N 29

Store the jack stand (1) in the brackets underneath the tongue, and secure using the two pins.



97-1542N 30

Tractor drawbar dimensions for drawbar swivel hitch tongue disc mower-conditioner

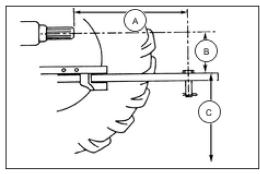
The disc mower-conditioner equipped with a drawbar swivel hitch requires that the drawbar be adjusted to provide a distance of **406 mm** (**16 in**) from the end of the tractor PTO shaft to the center of the hitch point on the tractor drawbar. The same distance is necessary whether using a **1** - **3/8 in 1000 RPM** PTO or **1** - **3/4 in 1000 RPM** PTO.

Adjust the tractor drawbar to a distance of **406 mm** (**16 in**) dimension (**A**) from the end of the tractor PTO shaft to the center of the drawbar hole. Ideally the top of the tractor drawbar should be **203 - 305 mm** (**8 - 12 in**) dimension (**B**) below the tractor PTO shaft. A drawbar positioned too low or high will affect the drive line angle, and may cause the PTO drive shaft to bottom out or pull apart in some conditions. Locate the drawbar directly below the PTO shaft. Clamp the drawbar so it cannot be moved from side to side.

The drawbar height above the ground dimension **(C)** should be **330 - 508 mm** (**13 - 20 in**) for tractors up to **125 Hp**, and **381 - 559 mm** (**15 - 22 in**) for tractors from **125 Hp** to **160 Hp**. **NOTICE:** Using a tractor with an incorrect PTO-to-hitch dimension can damage the front PTO and/or

the tractor PTO drive line.

NOTICE: If the tractor has a three-point hitch, adjust the lower links either as high as possible or as low as possible, or remove them, to prevent them from hitting the tongue when turning. **NOTICE:** The tractor drawbar size for the drawbar swivel hitch application should be **76.2 mm x 38.1 mm (3 in x 1.5 in)** or larger. Extended use with smaller drawbars may cause premature drawbar failure.



20106229N 31

Attaching the drawbar swivel hitch disc mower-conditioner to the tractor

NOTICE: Attach the drawbar extension solidly to the tractor drawbar, clamp the drawbar securely, and tighten set screws to limit side to side movement. Pivoting the tongue will put heavy side loads on the tractor draw bar.

Install the drawbar extension (1) and clamp (2) on the drawbar. Install the drilled pin (3) down through the hole in the extension and the rear hole in the drawbar. Install hairpin cotter as close as possible to the bottom of the drawbar. Tighten the 3/4 in nuts (4) evenly to 305 N·m (225 lb ft). Tighten set screws (5).

Attach the disc mower-conditioner to the tractor drawbar extension using the supplied hitch pin.

Remove pin (1) from forward hole on hitch and let pawl pivot down. Back tractor in so cross pin (2) in hitch extension is located under hook (3) on hitch. Lower jack until pin is engaged in hook. Rotate pawl back up and secure with pin (1).

Insert the safety chain through the loop on the drawbar extension and around the drawbar support. The safety chain is intended to keep the machine under control in the event of loss or failure of the drawbar extension.

Attach the PTO by pulling back on the slide collar, and slide the PTO forward on the tractor shaft until the pins engage in the tractor PTO shaft groove. The collar will slide forward automatically locking the PTO shaft onto the tractor shaft.

NOTE: The yoke where the collar slides must be free of paint and rust and must be kept lubricated with oil for the collar to slide freely.

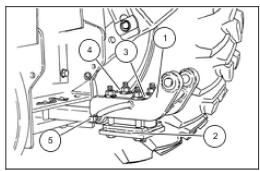
Check to make sure the PTO is locked on the tractor shaft. To remove, pull back on the collar to unlock the pins and remove the PTO.

Jack assembly (drawbar swivel hitch)

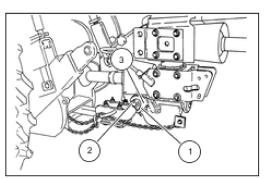
After attaching the disc mower-conditioner to the tractor, retract the jack by turning the hand crank counter-clockwise. Pull the pin and remove the jack (1). Store the jack under the tongue. Secure the jack with the pin.

Retract jack support (2) if it hangs too low for your field operation.

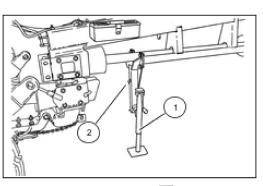
NOTE: To prevent the jack from unwinding during use, loop the chain around the handle before inserting the pin.



19996818N 32



19996817N 33 🖺



19996816N 34 🔠

Connecting hydraulic hoses to the tractor **AWARNING**

Escaping fluid!

Hydraulic fluid or diesel fuel leaking under pressure can penetrate the skin and cause infection or other injury. To prevent personal injury: Relieve all pressure before disconnecting fluid lines or performing work on the hydraulic system. Before applying pressure, make sure all connections are tight and all components are in good condition. Never use your hand to check for suspected leaks under pressure. Use a piece of cardboard or wood for this purpose. If injured by leaking fluid, see your doctor immediately. Failure to comply could result in death or serious injury.

W0178A

- 1. Be sure the hydraulic couplers on the hoses match the tractor couplings. If not install the correct couplers.
- 2. Attach both swing cylinder hoses (1) to the remote outlets of one tractor control valve.

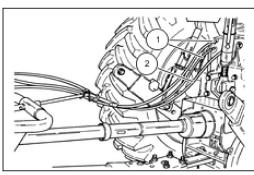
NOTE: If this valve is adjustable, set it for slow hydraulic flow.

3. Attach the single lift cylinder hose
(2) to a remote outlet from the second control valve. Connect the hose so the machine will raise when the hydraulic valve is pulled back in the opposite direction of the float position.

NOTE: Check the tractor operator's manual for instructions on which outlet should be used for single acting cylinders.

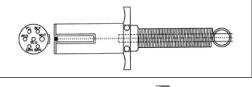
NOTICE: Tractor hydraulic relief valve pressure must not exceed **19305** kPa (**2800** psi), or the machine may be damaged. It will require a minimum of **10342** kPa (**1500** psi) to operate the lift cylinders.

 Attach the wire harness connector for the trailing lights to the tractor light connector. The lights wire harness uses a 7-pin trailer connector which conforms to SAE J560.



1431-2-03N 35 🚉



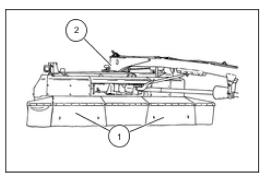


AWARNING

Unexpected machine movement! Air in the system or a high hydraulic flow rate can cause erratic operation. Before swinging the tongue, clear the area of all bystanders and obstructions.

Failure to comply could result in death or serious injury.

5. Ensure the cutter bar shields (1) are lowered before moving the unit to prevent damage to the shields. Disengage the tongue transport lock (2). Maneuver the tractor through both hard left and right turns. Shift the tongue both full left and full right, while raising and lowering the header. Check to be sure the hoses and wire harness do not get pinched or hung up on frame components. Secure excess hose and wire harness on the standard tongue using the rubber bungee strap.



4896-08N 37



Bleeding air from the lift cylinders **AWARNING**

Moving parts!

Disengage the Power Take-Off (PTO), turn off the engine, and remove the key. Wait for all movement to stop before leaving the operator's position. Never adjust, lubricate, clean, or unplug machine with the engine running.

Failure to comply could result in death or serious injury.

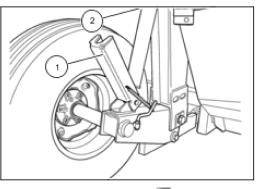
W0112A

AWARNING

Escaping fluid!

Hydraulic fluid or diesel fuel leaking under pressure can penetrate the skin and cause infection or other injury. To prevent personal injury: Relieve all pressure before disconnecting fluid lines or performing work on the hydraulic system. Before applying pressure, make sure all connections are tight and all components are in good condition. Never use your hand to check for suspected leaks under pressure. Use a piece of cardboard or wood for this purpose. If injured by leaking fluid, see your doctor immediately.

Failure to comply could result in death or serious injury.



50051190A 38



If the lift cylinders do not lift the frame evenly or if one side lifts higher than the other, rephase the cylinders by lowering the disc mower-conditioner, and continue to hold the lever in the lowering position for 10 to 15 seconds, or raise the disc mower-conditioner and continue to hold the lever in the raise position for 10 to 15 seconds. If the lift cylinders still do not extend far enough to install the header lift locks (1), there may be air in the hydraulic system that must be purged. Loosen the hose swivel fitting (2) at the upper end of the slave cylinder.

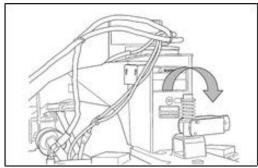
NOTE: Use a shop rag or other shielding means for protection from seeping oil at loosened fittings. With the tractor engine at a low idle, move the tractor hydraulic lever to the raise position to extend the master lift cylinder until oil flow from the loosened fitting is free of air. Then tighten the fitting.

NOTICE: If the cylinders do not extend far enough to release the header lift locks, air remains in the hydraulic system and must be purged. If the lift lock on the master cylinder side does not release, excessive oil may be in the slave cylinder circuit. Bleed this oil until both lock rods or channels (if equipped) are engaged. Raise and lower the header several times until all air is purged from the system. Repeat the previous steps if necessary.

Tongue shift transport lock

To disengage the tongue transport lock, rotate the transport lock bracket up and over (one half turn) so that the transport lockpin is spring loaded upwards. Shift the machine slightly so that the transport lockpin disengages from the trail frame.

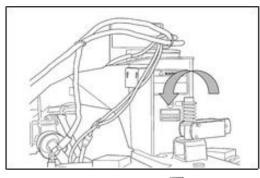
The tractor hydraulics can now be used to pivot the machine into the field position.



199985197NNA 39



To engage the tongue transport lock, rotate the transport lock bracket up and over (one half turn) so that the transport lockpin is spring loaded downwards. Shift the machine into the transport (center) position so that the transport lockpin engages in the trail frame.



199985197NNB 40

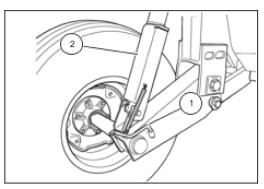
ADANGER

Unexpected machine movement! Always engage the transport stops when working around a raised header or when transporting the machine on a public road. Failure to comply will result in death or serious injury.

D0042A

To engage header lift lock channel:

- 1. Raise unit with tractor hydraulics until lift lock channel (2) engages under lift cylinder.
- 2. To engage header lift lock channels, pivot both right and left lock levers (1) forward. The channels (2) should move forward under the barrel of cylinder with the machine raised. Lower header onto the stops.

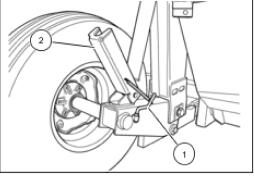


50051189A 41

To disengage header lift channel:

- 1. Raise unit with tractor hydraulics.
- 2. Rotate lift lock levers (1) rearward. The channels (2) should move rearward.

NOTE: If the cylinders do not extend far enough to release the header lift locks, there may be air in the hydraulic system that must be purged. Refer to "Bleeding Air from the Lift Cylinders" in this section. **NOTICE:** Always engage or disengage both header lift locks at the same time. Lowering the unit with one lock engaged could cause damage to the unit.



50051190A 42



Transporting the mower-conditioner **AWARNING**

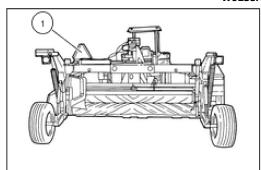
Transport hazard!

ALWAYS engage the header lift locks and the tongue swing cylinder lock during transport. If the locks are disengaged during transport and you accidentally engage the tractor hydraulics, the machine may drop onto the ground or swing to the right into roadside obstacles, oncoming traffic, or ditches. Failure to comply could result in death or serious injury.

Slow-moving vehicle emblem

Some states and provinces require Slow-Moving Vehicle (SMV) emblems on machines traveling at speeds under 32 km/h (20 mph). Consult local regulations for information and mounting requirements.

A SMV mounting bracket is located on the left rear frame. The SMV emblem (1) and mounting bracket are furnished as standard equipment on the disc mower-conditioner.



W0235A

Disc knives

Several disc mower-conditioner knives are available through Service Parts. Each type of knife is designed to function well in specific crop and field conditions. Contact your authorized dealer for the disc mower-conditioner knife that will work best in your conditions.

7 degree twist knives

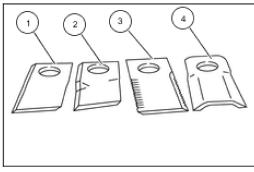
The 7 degree twist knives (1) are recommended for abrasive soil or crop cutting conditions. These knives function well in a wide range of field and cutting conditions.

14 degree twist knives

The 14 degree twist knives (2) are recommended in most crop conditions. A greater knife twist angle enables the knife's cutting edge to cut closer to the ground while providing more lifting action to move the crop over the cutter bar into the conditioner, producing a cleaner cut in most light crop conditions. However, because of the greater twist angle of the knife, these knives are more susceptible to rock damage. All disc mowerconditioners are shipped with these knives from the plant.

14 degree twist serrated knives

The 14 degree knife is also available in a serrated version (3). The serrated knife will last longer and is more aggressive. It works well in sudan and grass seed.



76075992N 1

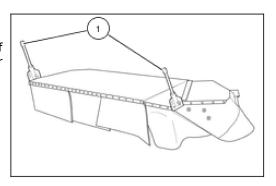


V knives

The V knives **(4)** are recommended in rocky conditions where excessive knife bending is a concern. The V knife is to be installed with the concave side facing downward. This style knife has a greater resistance to bending when coming in contact with a foreign object. The cutting quality of this knife is not as good as with the twisted knives and will deteriorate with knife wear. However, they are more resistant to bending in rocky field conditions.

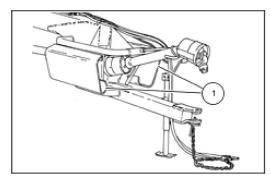
Corner marker kit

The corner marker kit consists of two flexible marker posts (1) that bolt onto the front corners of the header. These provide the operator with a clear view of the location of the front corners of the header during operation. The header markers also provide a mounting location for flags that may be used when transporting the disc header on public roads. Flags may be purchased locally.



Bumper extensions (standard tongue only)

Bumper extensions (1) are required to limit the turn angle between the tractor and the pivot tongue disc mower-conditioner on tractors where the drawbar extends more than 305 mm (12 in) bhind the rear tractor tires (when set at 609 mm (24 in) from end of tractor PTO shaft), to prevent bottoming out the primary PTO 80 ° CV joint causing failure.



4896-03N 1

Truck hitch (swivel hitch tongue) A DANGER

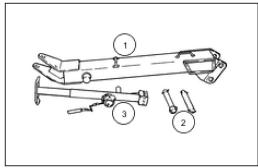
Loss of control hazard!

Make sure you use a towing vehicle with adequate weight. Towing with an underweight vehicle could cause a loss of control during transport or braking. Calculate the minimum towing vehicle weight required as instructed in this manual.

Failure to comply will result in death or serious injury.

A truck hitch is available for use with the disc mower-conditioner equipped with the swivel hitch tongue. This will allow towing of the swivel hitch disc mower-conditioner with a suitably sized truck. The truck hitch (1) includes two clevis pins with linchpins (2), a safety chain and attaching hardware (not shown), and a side wind-style jack (3).

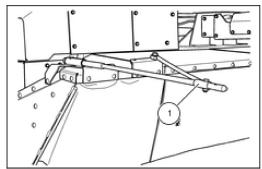




Crop divider

The crop divider kit adds a crop divider on both sides of the header.

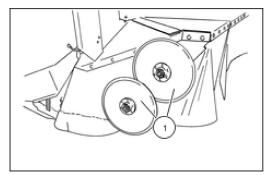
Crop dividers **(1)** deflect material toward the center of the header to ensure that the entire crop passes through the header.



Crop divider

The rolling crop dividers (1) are a set of disc coulters that can be installed onto the outer shrouds of the header to aid in crop feeding and to prevent the bulldozing of crop material. The disc coulters allow tangled, matted crop, or loose crop material, (i.e., discharge from a combine) to roll under the shroud and then be cut by the cutter bar knives.

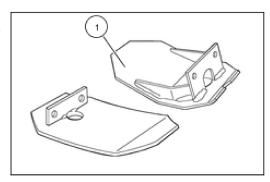
The disc and mounting plates are available through Service Parts.



High stubble kit

The high stubble kit is intended to provide a higher cutting height for clipping pastures, or for crops where a higher stubble height is desirable. Cutting height is approximately **127 mm** (**5 in**) at 2 degrees cutter bar tilt to approximately **89 mm** (**3** -1/2 in) at 10 degrees cutter bar tilt.

The high stubble kit consists of eight high skid shoes (1). All eight skid shoes should be installed to minimize shoe wear and provide proper flotation of the cutter bar.

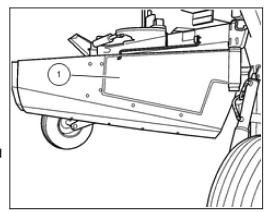


Windrow shield extensions

The Windrow shield extensions (1) are intended to provide an improved windrow formation for crops that are either extra heavy or extra light (RH extension shown).

The Windrow shield extensions ensures heavy or light crop exiting the roll conditioner is placed in a neat, straight windrow.

The Windrow shield extensions consists of left hand and right hand extension along with necessary mounting hardware.



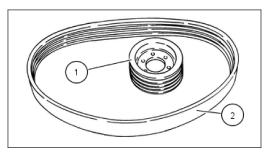
Low speed rotor kit

Low speed rotor kit - Flail conditioner model only

The low speed rotor kit is available for less aggressive conditioning. A larger sheave and a 4HB banded V-belt enable the rotor and flails to rotate at a slower rate of speed. The standard rotor speed is **1011 RPM**. The low speed rotor kit will decrease the rotor to **726 RPM**.

The contents of the kit are shown.

- (1) Sheave
- (2) HB banded belt

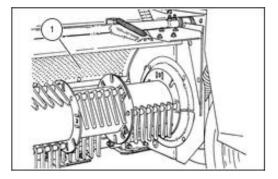


19982121N 1

Dimpled hood liner

- Flail conditioning model only

The dimpled hood liner kit is available for more aggressive crop conditioning. The standard smooth hood liner (1) must be removed prior to installing the dimpled hood liner. This kit includes two dimpled hood liner sections and the appropriate hardware to install the liner sections.



NOTICE

INSERT THE FOLLOWING:

Insert Workbook (11 x 17 Saddle stitch book)

